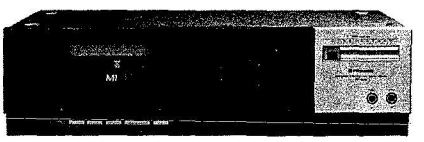
PIONEER®

Service Manual

CIRCUIT & MECHANISM DESCRIPTIONS
REPAIR & ADJUSTMENTS



ORDER NO.
ARP-150-0

STEREO CASSETTE TAPE DECK

CT-330

MODEL CT-330 COMES IN FIVE VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KU	AC120V only	U.S.A. model
HE	AC220V and 240V (Switchable)	Europe model
HB	AC220V and 240V (Switchable)	United Kingdom model
HP	AC220V and 240V (Switchable)	Australia model
D	AC120V, 220V and 240V (Switchable)	General export model

- This service manual is applicable to the KU type. When repairing the HE, HB, HP and D types, please see page 42.
- For the mechanism description please refer to the supplement of model CT-3 service manual <ARP-061>.
- Ce manuel d'instruction se refère au mode de réglage, en français.
- Este manual de servicio trata del método de ajuste escrito en español.

CONTENTS

1. SPECIFICATIONS 2
2. FRONT PANEL FACILITIES 3
3. DISASSEMBLY 4
4. PARTS LOCATION 5
5. BLOCK DIAGRAM 7
6. CIRCUIT DESCRIPTIONS 8
7. EXPLODED VIEWS 12
8. PACKING 18
9. PARTS LIST 18
10. P.C. BOARDS CONNECTION DIAGRAM 21
11. SCHEMATIC DIAGRAM 25
12. MECHANICAL ADJUSTMENTS 27
    RÉGLAGES MÉCANIQUES 28
    AJUSTES MECÁNICOS 29
13. ELECTRICAL ADJUSTMENTS 30
    RÉGLAGES ÉLECTRIQUES 34
    AJUSTES ELÉCTRICOS 38
14. FOR THE HE, HB, HP AND D TYPES 42

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1. SPECIFICATIONS

Systems . . . . . Compact cassette, 2-channel stereo
Heads . . . . . Hard Permalloy" recording/playback head X 1
"Ferrite" erasing head X 1
Motor . . . . . DC servo motor X 1
Wow and Flutter . . . . . No more than 0.05% (WRMS)
Fast Winding Time . . Approximately 100 seconds (C-60 tape)
Frequency Response
—20dB recording:
Normal tape . . . . . 25 to 14,000Hz
(35 to 12,000Hz ± 3dB)
Chrome tape . . . . . 25 to 16,000Hz
(35 to 15,000Hz ± 3dB)
Metal tape . . . . . 25 to 16,000Hz
(35 to 15,000Hz ± 3dB)
Signal-to-Noise Ratio
Dolby NR OFF . . . . . More than 57dB
Noise Reduction Effect
Dolby NR ON . . . . . More than 10dB (at 5kHz)
Harmonic Distortion . . . . . No more than 1.2% (0dB)
Input
(Sensitivity/Maximum allowable input/Impedance)
MIC (L, R) . . . . . 0.3mV/57mV/10kΩ, 6mm diam. jack
(Reference MIC impedance; 250Ω to 10kΩ)
LINE (INPUT) 50mV/25V/75kΩ
Output (Reference level/Load impedance)
LINE (OUTPUT) 450mV/50kΩ

Subfunctions

- Dolby NR system (ON/OFF) B type
- 3 position tape selector (NORM/CrO_2/METAL)
- Air damp eject function
- Full automatic stop mechanism
- REC muting function
- Music search function
- Timer stand-by mechanism
- LED level meter

Miscellaneous

Power Requirements . . . . . AC 120V, 60Hz
Power Consumption 12watts
Dimensions . . . . . 420(W) X 119(H) X 232(D) mm
16-9/16(W) X 4-11/16(H) X 9-1/8(D) in
Weight (without package) . . . . . 4.3kg (9 lb 4 oz)

Furnished Parts

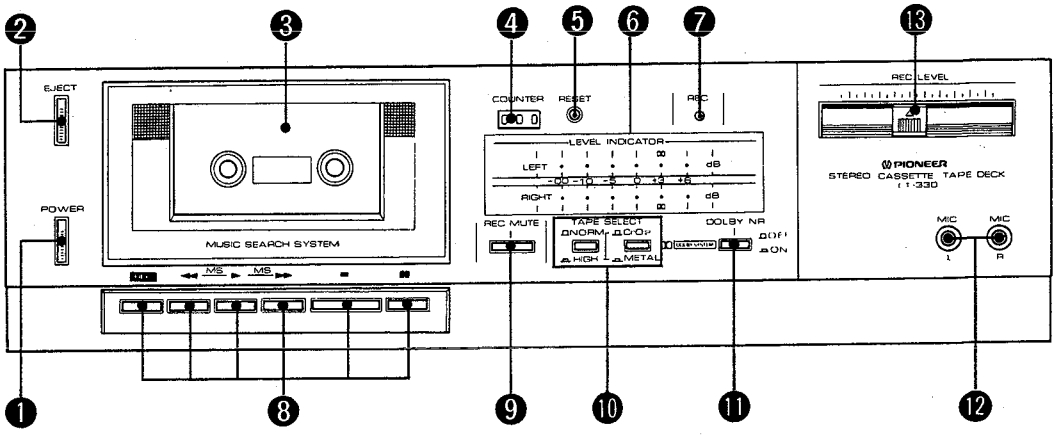
Operating instructions 1
Connection cord 2

NOTE:
Specifications and the design subject to possible modifications without notice due to improvements.

NOTES:

1. Reference Recording Level: Meter 0dB indicating level (160) nwb/m magnetic level = Philips cassette reference level)
2. Reference Signal: 333Hz
3. Wow & Flutter: • JIS [3kHz, with acoustic compensation (weighted), rms value]
4. Frequency Response: • Measured at —20dB level, DOLBY NR OFF, level deviation is ±6dB without indication.
5. Signal to Noise Ratio: • Measured at the third harmonic distortion 3% level, weighted.
6. Sensitivity: Input level (mV) required for reference recording level with input (REC) controls set to maximum.
7. Maximum Allowable Input: While decreasing settings of input (REC) level controls and increasing level at input jacks, this is the maximum input level (mV) at the point where recording amplifier output waveform becomes clipped.
8. Reference Output Level: Playback output level when meter indicates 0dB.

2. FRONT PANEL FACILITIES



❶ POWER SWITCH

When this switch is depressed, the power is turned on and the level indicator −∞ lights. Depress the switch again to release it when turning off the power to the deck.

- The muting circuit is actuated after the POWER switch has been set to ON and there will be no operation for about 4 seconds. This is not a failure or malfunction.
- When the POWER switch is set to the OFF position while the tape deck is operating, the deck's operation is released and the stop mode is established.

❷ EJECT BUTTON

Depress this button to open the cassette holder. To close the cassette holder, push the top back until it locks.

- Do not press this button when the tape is in motion.

❸ CASSETTE DOOR

❹ TAPE COUNTER

This counter shows the position of the tape using a three-digit meter.

❺ COUNTER RESET BUTTON

Depress this button to reset the tape counter display to 000.

❻ LEVEL INDICATOR

These indicate the input level during recording and the output level during playback.

❼ REC INDICATOR

This indicator lights during the recording mode.

❽ OPERATING SWITCHES

REC : Depress this switch to start tape recording. When this switch is depressed to ON position, the REC indicator will be illuminated. This switch will not work when a cassette is not loaded or when the erasure prevention tabs of a loaded cassette have been broken off.

◀◀ (REW) : Depress this switch to rewind the tape at high speed (The tape will travel from right to left).

▶ (Play) : Depress this switch to start tape playback. Refer to page 8 for details on the MS (Music Search) function which locates the start of a program when the ▶ (Play) switch and either ◀◀ (REW) or ▶▶ (FF) switch are depressed.

▶▶ (FF) : Depress this switch to send the tape forward at high speed (The tape will travel from left to right).

■ (STOP) : Depress this switch to stop the tape travel and to release the operating switches.

❚❚ (Pause) : Depress this switch to stop the temporarily during recording or playback. Release this switch to allow the tape to continue to travel.
The tape does not stop during fast forward or rewind operations even when the ❚❚ (Pause) switch is depressed.

❾ REC MUTE SWITCH

Depressing this switch during recording makes it possible to create an unrecorded blank on the cassette tape only for the time during which the switch is kept depressed. This switch is used for providing blanks of the required length between programs and editing tapes so that they are easier to listen to and for creating the unrecorded blanks which are required for operating the MS (Music Search) facility.

- No signal are recorded when the switch is touched during recording. Do not touch the switch unless necessary.

❿ TAPE SELECTOR SWITCHES

This selector allows the bias and equalizer characteristics to be selected during recording and equalizer characteristics during playback in line with the type of tape you are using.

Normal tape : Release the left switch to the "out" position (▁ NORM).

Chrome tape : Depress the left switch to the "in position (▁ HIGH) and release the right switch to the "out" position (▁ CrO_2).

Metal tape : Depress both the right and left switches to the "in" positions.

⓫ *DOLBY NR SWITCH

Depress this switch to ON for recording with the built-in Dolby Noise Reduction system and for playback of tapes which have been recorded using the Dolby Noise Reduction system. For other tapes, do not press this switch.

⓬ MIC JACKS

These are the input jacks for microphone recording. Plug the left channel microphone into the L jack and the right channel microphone into the R jack.

⓭ REC LEVEL CONTROL

Use this to adjust the level of the input signals from the MIC jacks or rear panel LINE INPUT. Sliding this control to the rightward increase the level.

3. DISASSEMBLY

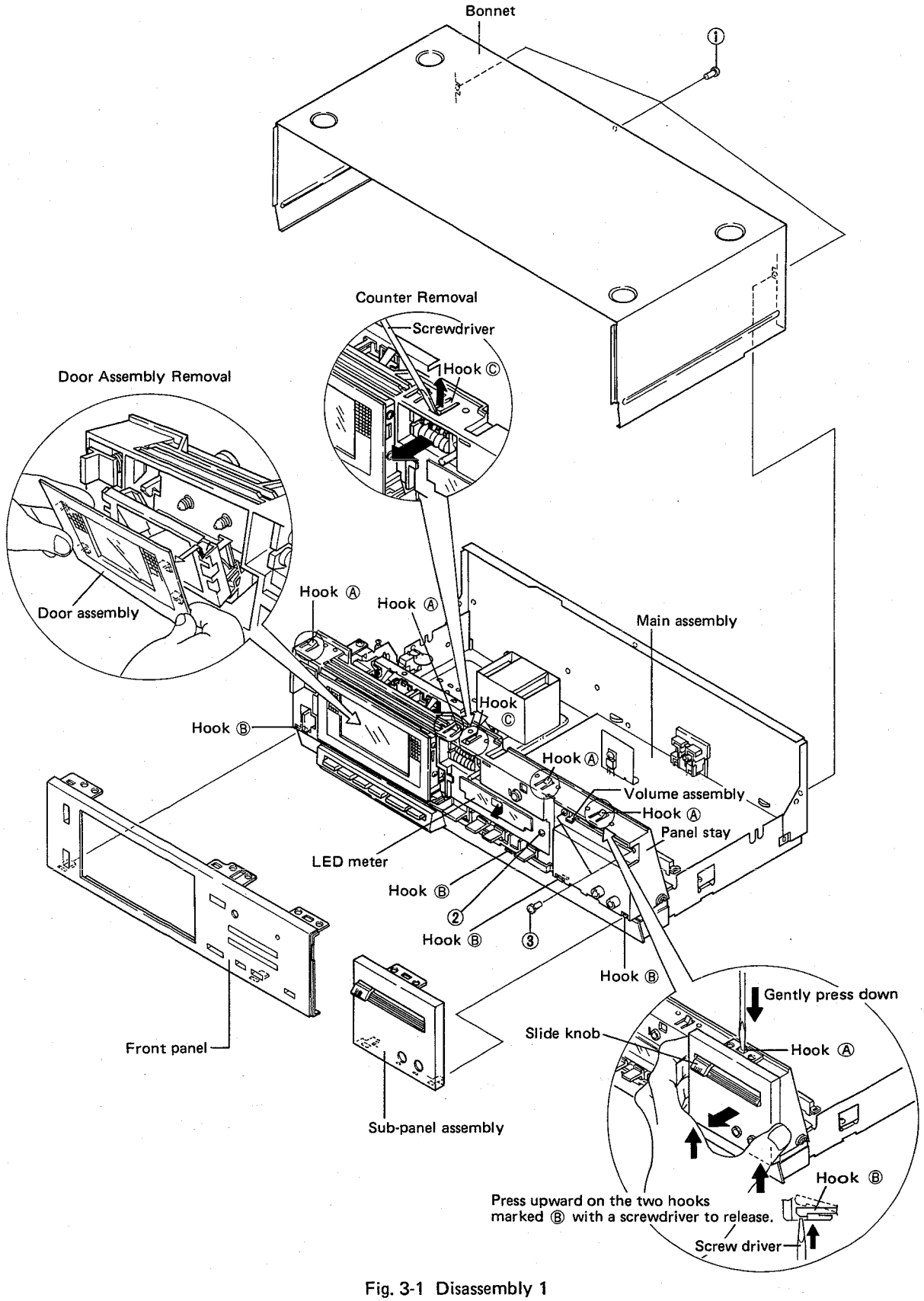


Fig. 3-1 Disassembly 1

■ **Bonnet**

Remove the three screws marked ① .

■ **Sub-Panel Assembly**

1. Gently press down on hook Ⓐ with a screwdriver to release it from the panel stay and pull the panel stay outward to free it.
2. Press upward on the two hooks marked Ⓑ with a screwdriver to release them and pull the sub-panel assembly outward. (When reattaching the sub-panel assembly, set the slide knob and volume assembly sliding resistor to the minimum position.)

■ **Front Panel Assembly**

1. Remove the sub-panel assembly.
2. In the same manner as when removing the sub-panel assembly, press down on hooks Ⓐ (three places) from left to right or right to left to release them from the front panel assembly and release hooks Ⓑ (2 places) so the front panel assembly can be pulled outward.

■ **Door Assembly**

1. Press the eject button to open the cassette holder.
2. Lift the door assembly upward and pull outward.

■ **Counter**

1. Remove the counter belt.
2. Using a small screwdriver, gently press upward on hook Ⓒ and pull the counter outward to remove it.

■ **LED Meter**

Unscrew screw ② and slide the LED meter to the right to remove it.

■ **Volume Assembly**

Unscrew the two screws marked ③ and pull the volume assembly out from the inside of the panel stay.

■ **Tape Mechanism Assembly**

1. Remove the counter belt and REC joint D.
2. Remove the six screws marked ④ .

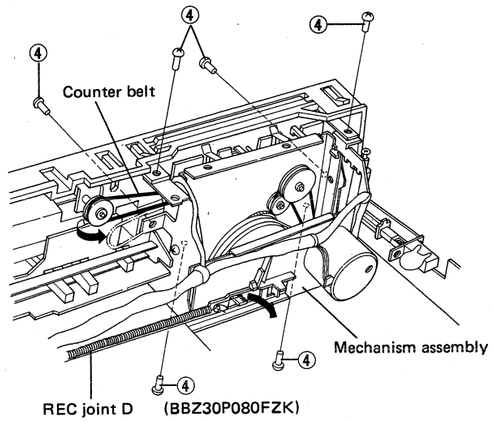
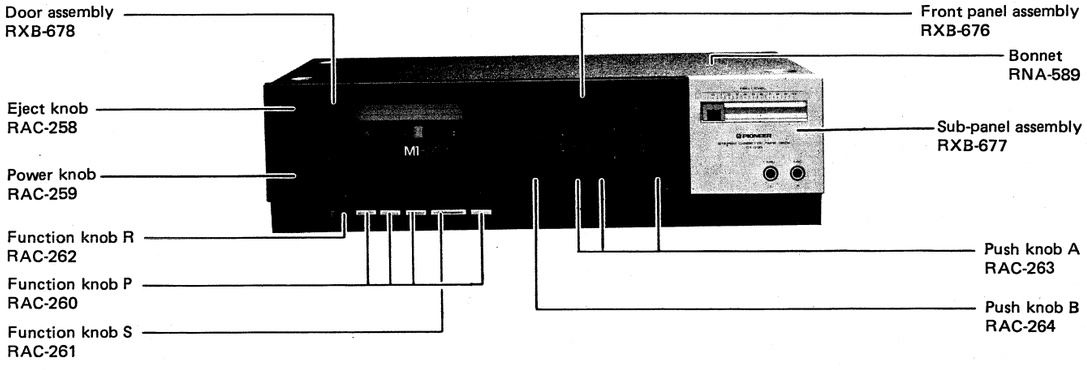


Fig. 3-2 Disassembly 2

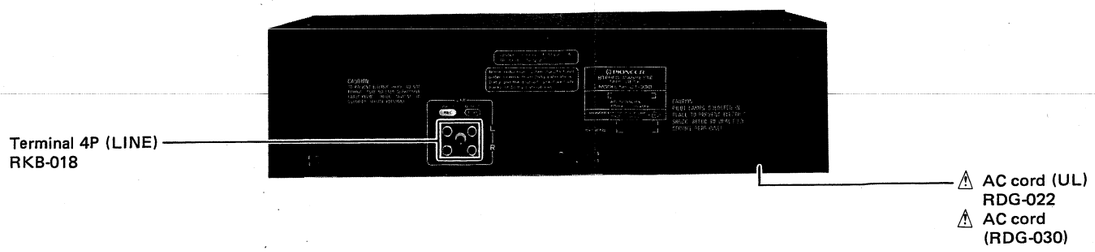
4. PARTS LOCATION

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

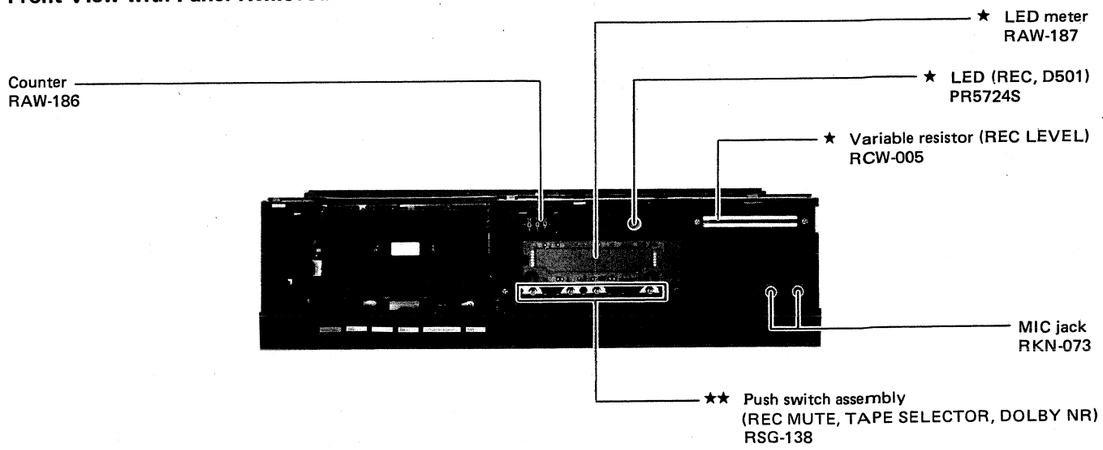
Front Panel View



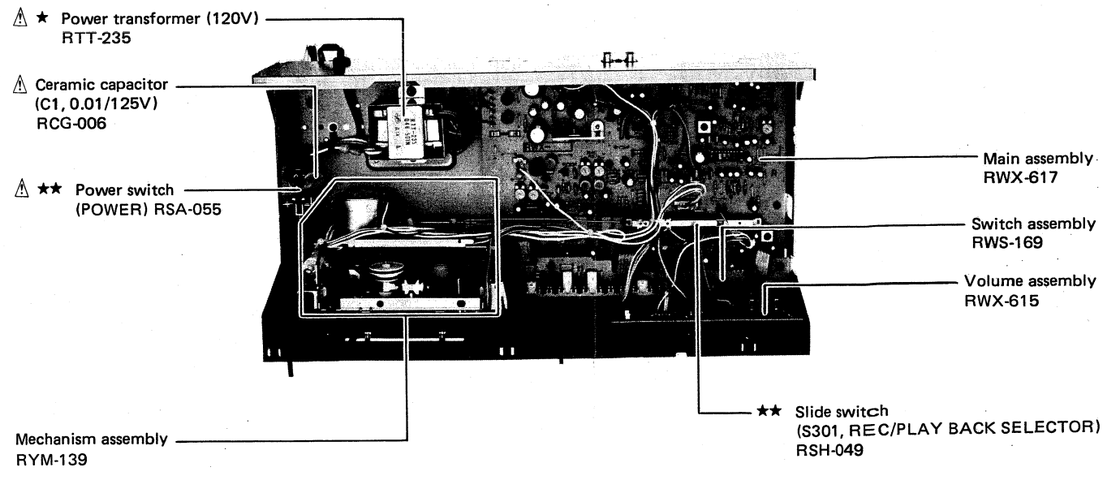
Rear Panel View



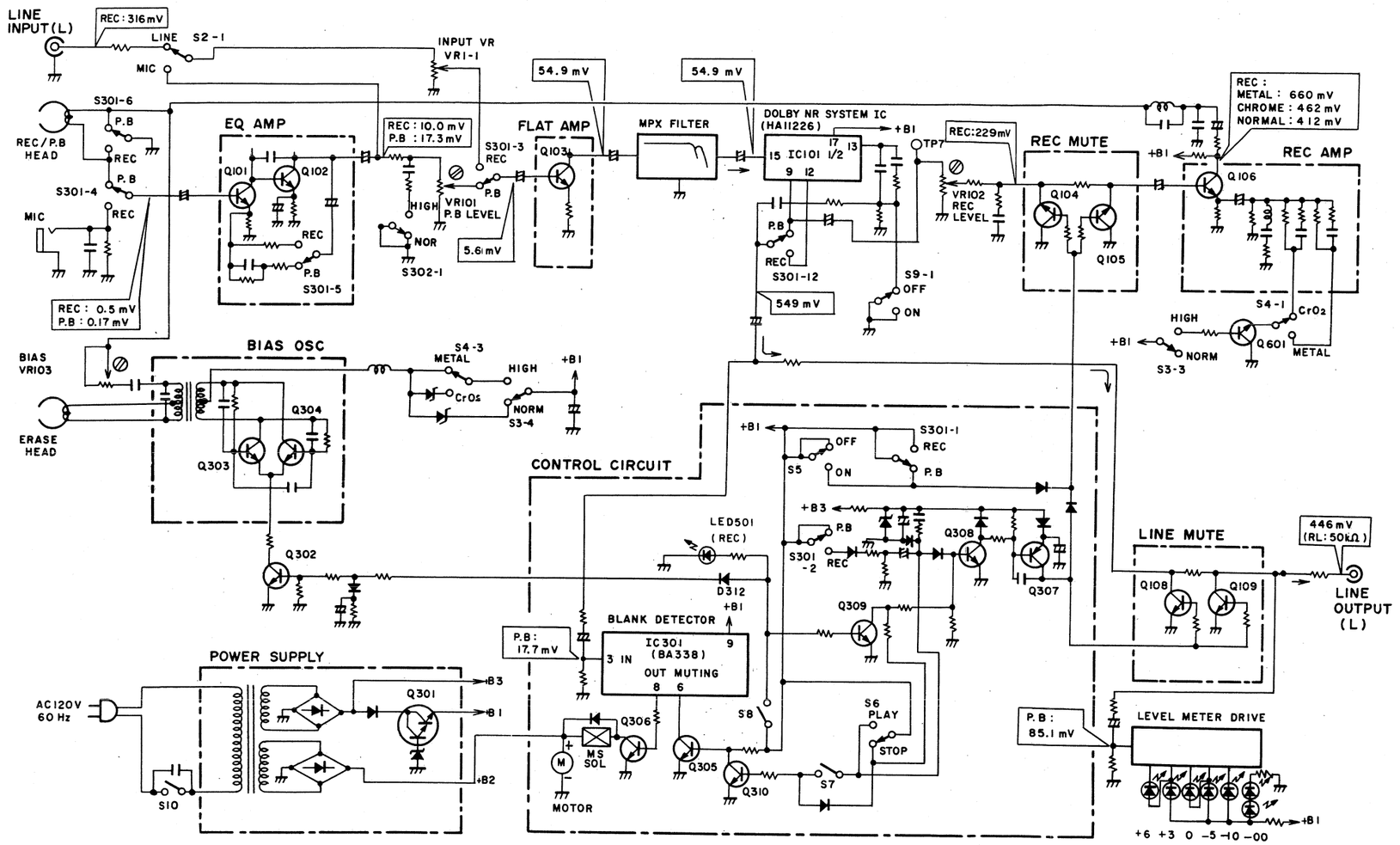
Front View with Panel Removed



Top View with Bonnet Removed



5. BLOCK DIAGRAM



SWITCHES

S301 : REC/PLAYBACK SELECTOR (REC – PLAYBACK)
S2 : INPUT SELECTOR (MIC – LINE)
S3 : TAPE SELECTOR (NORMAL – HIGH)
S4 : TAPE SELECTOR (CrO_2 – METAL)
S5 : REC MUTE (ON – OFF)
S6 : PLAY (PLAY – STOP)
S7 : FAST (FF – OFF)
S8 : REC (ON – OFF)
S10 : POWER (ON – OFF)
S9 : DOLBY NR (ON – OFF)

6. CIRCUIT DESCRIPTIONS

A block diagram of the circuits described in this section can be found on page 7.

6.1 PLAYBACK SIGNAL PATH

The audio signal picked up by the playback head is amplified to a constant level by the playback equalizer amp (Q101, Q102), and flat amp (Q103). It then proceeds to the LINE OUTPUT terminal, passing through the MPX filter and Dolby amp (IC101) along the path.

6.2 RECORDING SIGNAL PATH

The recording signal applied to the LINE INPUT terminal passes first through the INPUT potentiometer (volume), and is then input to the flat amp (Q103). A recording signal input through the MIC jack is first amplified by Q101 and Q102, then passes through the INPUT potentiometer (volume) on its way to the flat amp (Q103) where it is amplified to a constant level.

When the Dolby NR switch is placed ON, the portion of the signal processed through the Dolby circuit is combined with the original signal and output from pin 9 of IC101. It then passes through the recording level adjustment potentiometer and into the recording amp (Q106). Signals not processed through the Dolby NR circuit are output from pin 12 of IC101.

After frequency response characteristics are adjusted by the equalizer circuit in the recording amp to conform with the type of tape being used, the signal is then passed to the recording head.

When the recording mode is selected, S8 goes ON, causing +B to pass through D312 and be input to Q302, turning it ON. As Q302 goes active, the bias oscillator (Q303, Q304) commences operation, and at the same time that erase current is fed to the erase head, bias current is also passed through the bias adjustment potentiometer and fed to the recording head.

6.3 MUTING CIRCUIT (Refer to Fig. 6-1)

The muting circuit functions to prevent transient noise (occuring when the power switch is turned ON, or when the various mode switches are operated) from being output from the LINE OUTPUT terminal. It also prevents these noises from being recorded onto the tape.

- **Power switch ON muting**

1. When the power switch is turned ON, current flows from the power transformer secondary following the path D301 → R316 → C326 → R318 → D306, and as long as C326 is in a charged status, Q308 is ON.
2. When Q308 comes ON, the base potential of Q307 drops, turning Q307 ON.
3. Q307 going ON causes Q108 and Q109 to come ON, eliminating any chance of noise output from the LINE OUTPUT terminal.

- **Power switch ON → OFF muting**

1. When the power switch (S10) is changed from the ON to OFF status, the charged stored in C328 is discharged following the path Q307 → R319 → D308, causing Q307 to the ON.
2. When Q307 comes ON, Q108 and Q109 also come ON effecting the muting status, and preventing any noise output through the LINE OUTPUT terminal.

- **STOP → PLAY mode muting**

1. When the PLAY switch is depressed, the mechanism goes from a STOP to a PLAY status, and S6 is thrown to the PLAY side.
2. +B is then present at S6, and this current follows the path R326 → C324 → D306. In this case, Q308 is held in an ON status for as long as C324 is charging.
3. While the interval Q308 is ON, Q307 is also ON, and as occured during power switch ON muting, Q108 and Q109 are ON, cancelling any signal output from the LINE OUTPUT terminal.

- **STOP mode muting**

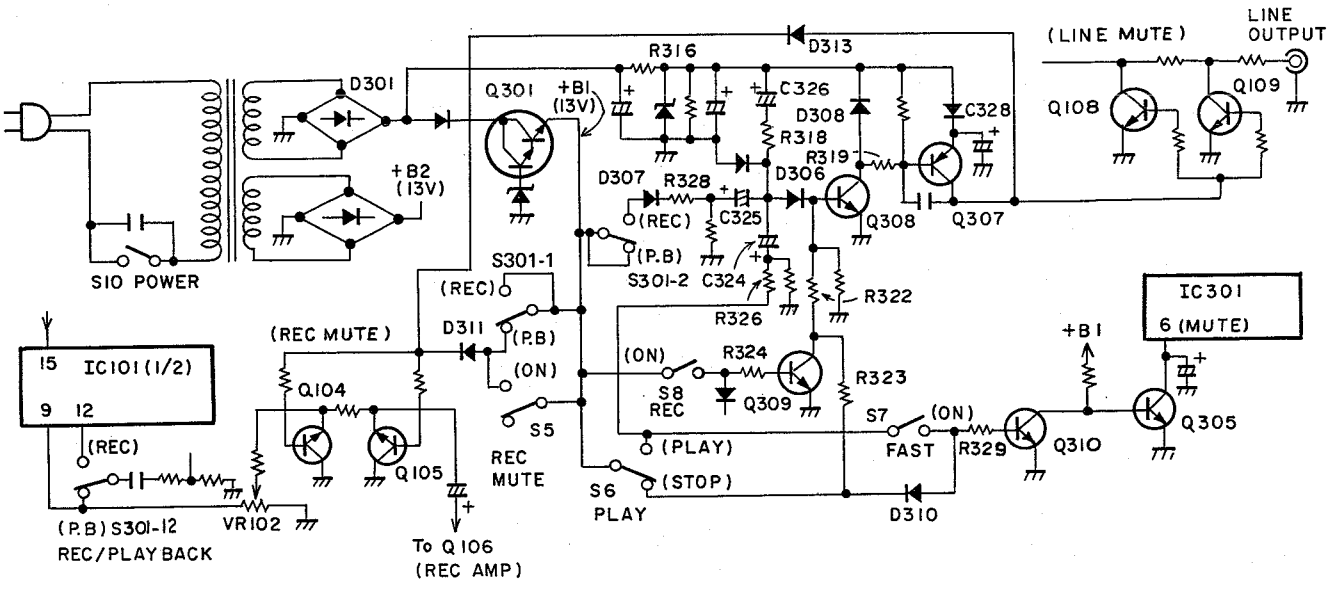
1. When the mechanism goes into the STOP mode, +B current is present at S6, and flows through the path R323 → R322, turning Q308 ON.
2. When Q308 goes ON, Q307 also goes ON, triggering Q108 and Q109 ON and muting LINE OUTPUT. Also, as the current passes through D313 and turns Q104 and Q105 ON, RECORD mode muting is also effected.

- **STOP → REC mode muting**

1. When the mechanism goes from the STOP to the REC mode, S6 is thrown to the PLAY side, and S301-1 and S301-2 are thrown to the REC side.
2. When S6 is at the PLAY side, the muting time applied to the LINE OUTPUT terminal (noted in STOP → PLAY mode muting) is extended. Then as S301-2 goes to the REC side, +B current is applied to D307, flowing through the path R328 → C325 → D306. The ON time of Q308 is extended while C325 is being charged, thus delaying the muting lift time.
3. While the interval Q308 and Q307 are ON, Q104 and Q105 also remain ON (via D313). Thus, in the time period prior to tape travel becoming stable, or when one of the mode switches is operated, any transient occuring will not be recorded onto the tape.

- **MUSIC SEARCH (MS) mode muting**

1. When the PLAY switch (S6) and FAST switch (S7) are depressed together, the MS mode is entered and S6 is thrown to the PLAY side, and S7 to ON.



Fi. 6-1 Muting circuit

2. +B current is present at S6 and flows through the path S7 → D310 → R323 → R322, turning Q308 ON. Also, Q307, Q108, and Q109 are ON until the tape stops between music selections, thus muting LINE.

- **Muting lift during REC PAUSE**

1. When the PAUSE button is pressed while the unit is in the REC mode, S6 is thrown to the STOP side, however, since S8 is still in an ON status, +B remains present at S8 and through R324, turn Q309 ON.
2. When Q309 is ON, both Q308 and Q307 remain in an OFF status, lifting LINE muting during this interval.

6.4 MUSIC SEARCH (MS) OPERATION (Refer to Fig. 6-2 and 6-3)

The MS mode functions to locate music selections by locating non-recorded sections of over 4 seconds duration in the tape. MS operation is controlled by IC301 (BA338).

1. The MS mode is entered when the PLAY switch (S6) and FAST switch (S7) are depressed together. This causes S6 to be thrown to the PLAY side and S7 to be thrown ON. +B1 is applied to Q310 (via R329), turning Q310 ON. As Q310 comes ON, the base potential of Q305 drops turning it OFF, and the muting is lifted from the 6 pin of IC301. As muting is lifted, MS commences its operation.
2. The audio signal picked up from the playback head travels the path EQ amp → flat amp → MPX filter → IC101 pin 15 → IC101 pin 9, and is input to pin 3 of IC301 (The operation of IC301 will be covered later.)
3. When the audio signal at pin 3 of IC301 is below the input decision level, a pulse is output from pin 8 of IC301 and Q306 goes instantly ON. When Q306 goes ON, the MS solenoid is activated and the FAST travel mechanism is released (by S7 going OFF), and the PLAY mode is re-entered.
4. As S7 goes OFF, so does Q310. Q305 goes ON, and muting is applied to pin 6 of IC301 ending MS operations.

IC301 (BA338) Blank Detector Operation

BA338 is the IC performing the tape blank detection function. It consists of a preamp (with limiter circuit), comparator, flip-flop, and driver. (Refer to the block diagram and timing chart in Figs. 6-3 and 6-4 respectively.)

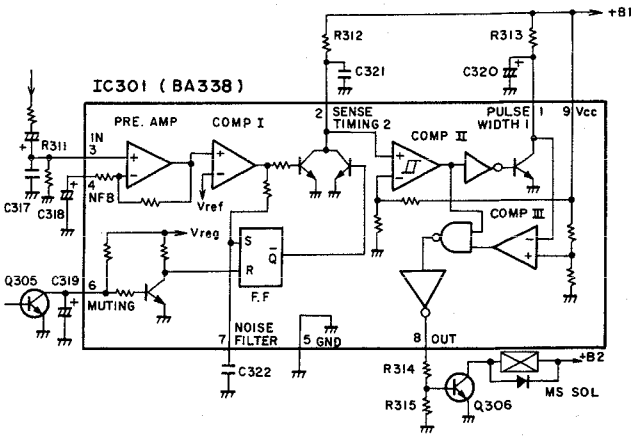


Fig. 6-3 BA338 Block diagram

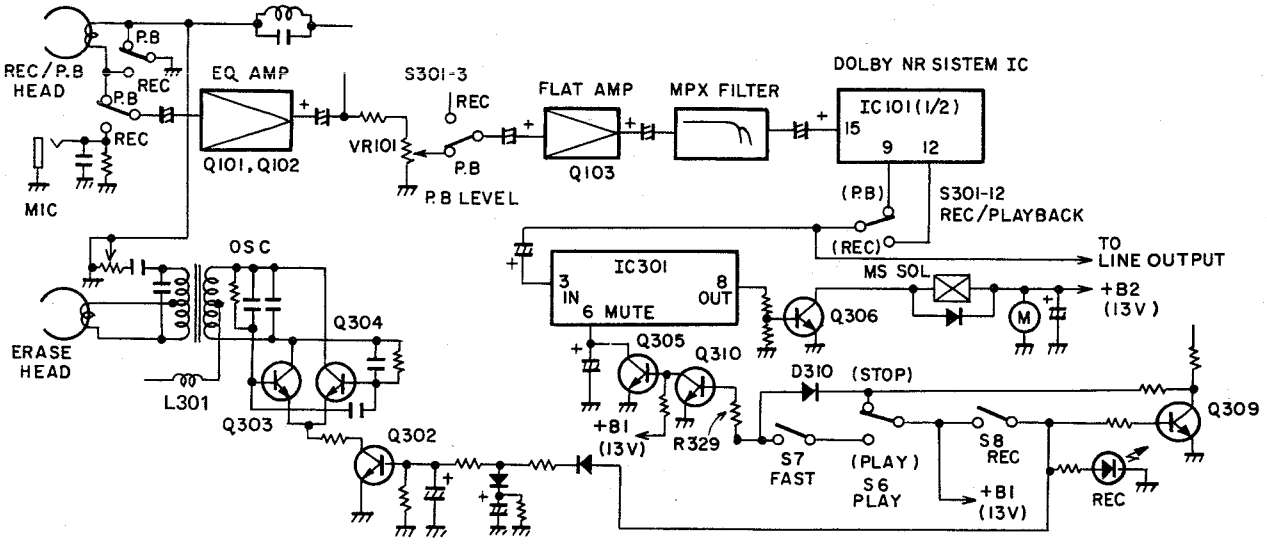


Fig. 6-2 MS operation

1. In the FAST mode, the audio signal enters pin 3 of BA338. After amplification by the preamp, it is compared with the reference voltage (Vref) by comparator I. If the signal is below the input decision level (in which case the tape is not recorded, or is recorded with an extremely low level signal), the potential at pin 2 begins to rise according to the time constant set by C321 and R312 (this C/R time constant also determines blank detection time), and when it reaches 1/2 Vcc, the output of the blank detection time setting comparator (comparator II) is triggered to the opposite state. (Blank detection time is determined from the point the input signal dropped below the input decision level to the point when the output pulse is produced.)
2. From this point, the potential at pin 1 (output pulse width set by C/R time constant) begins to rise in accordance with the time constant of C320 and R313. When it reaches 1/2 Vcc, the pulse width setting comparator (comparator III) is triggered to the opposite state. Thus, during the interval between the point where the blank detection time setting comparator (comparator II) is reversed and the pulse width setting comparator (comparator III) is reversed, output is at a HIGH level.
   This HIGH level output turns Q306 ON, operating the MS solenoid.
3. When the power switch is turned ON, or when muting is OFF, a fixed-time interval reset pulse is generated resetting the internal flip-flop circuit, and no output pulse is produced. (Capacitor C319 connected to pin 6 serves to prevent the song finder function from until the circuits have stabilized after power has been turned ON.) After this, the input signal sets the flip-flop circuit, and the song finder function enters into a waiting status, and an output pulse is produced at each blank between music selections.

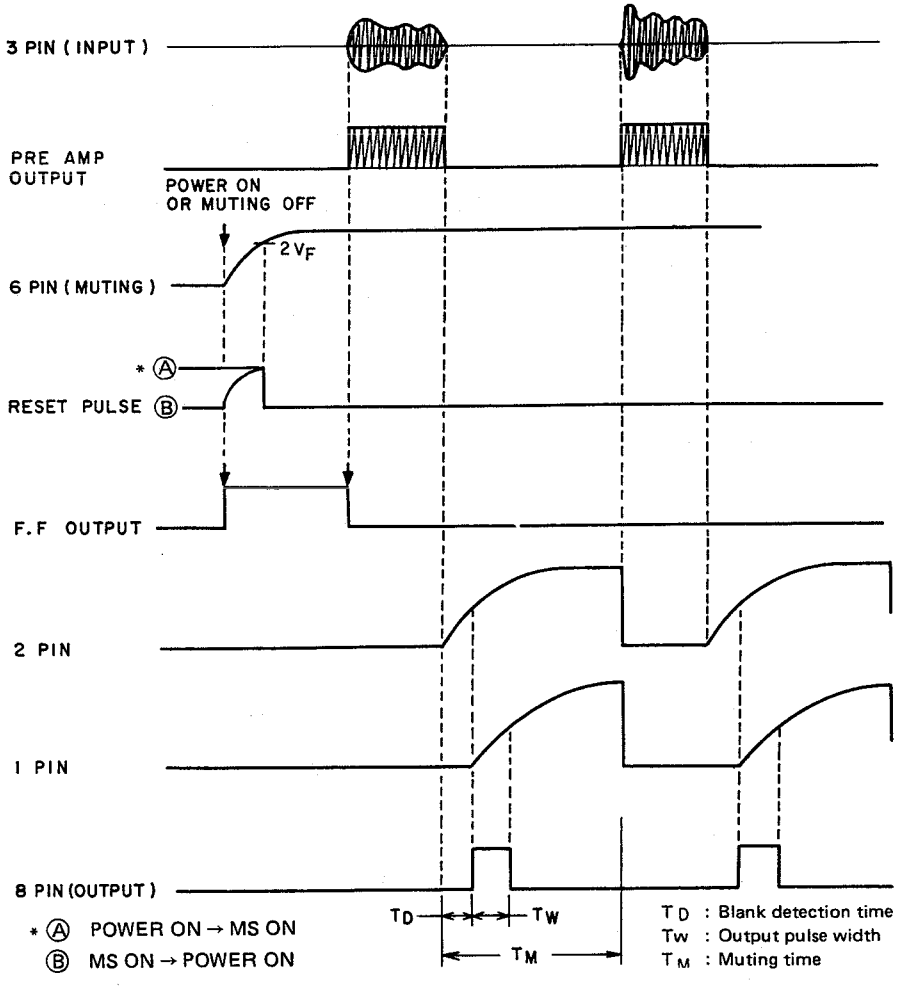


Fig. 6-4 BA338 Timing chart

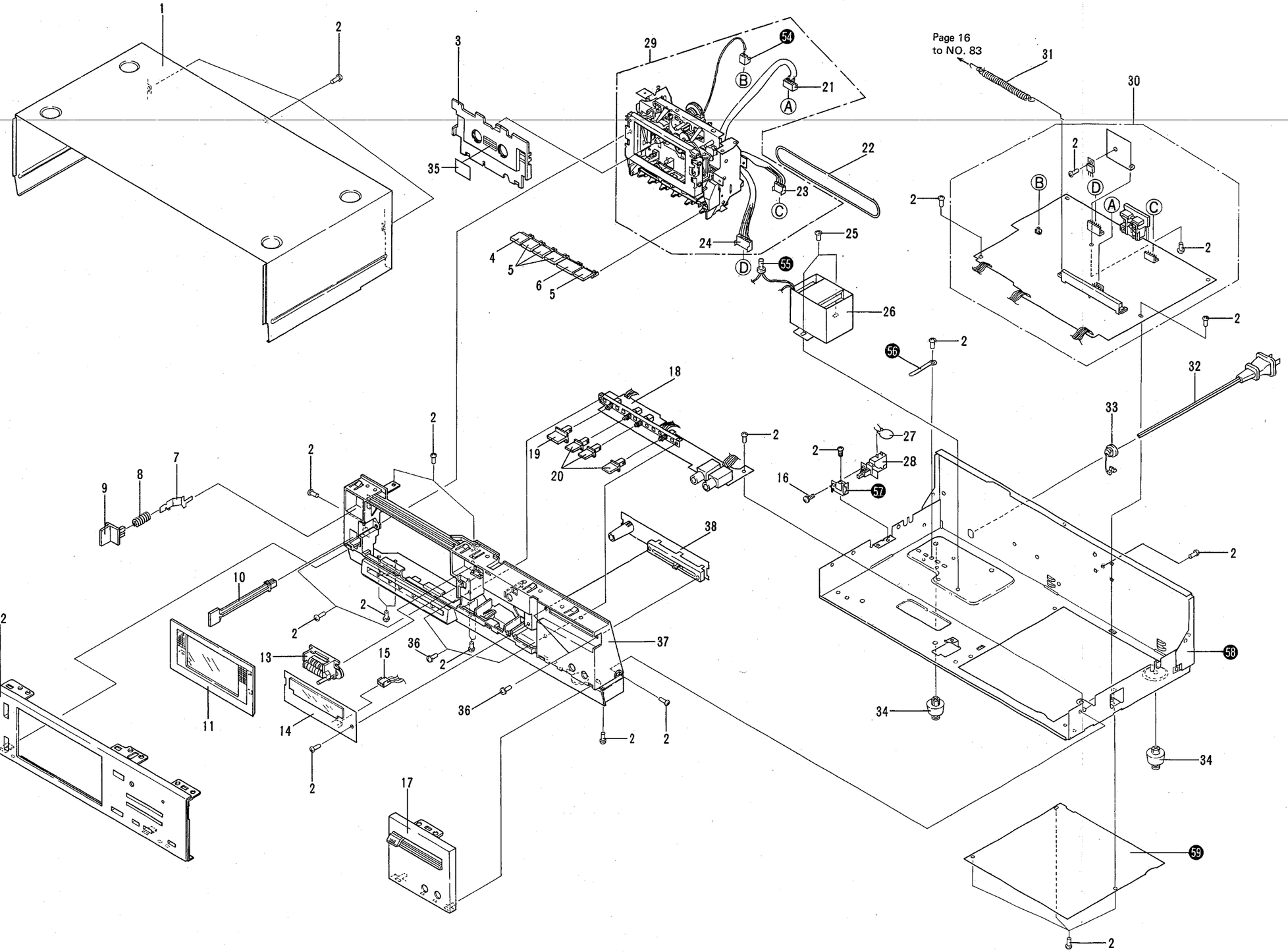
7. EXPLODED VIEWS

NOTES:

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Parts List

Mark	No.	Part No.	Description
	1.	RNA-589	Bonnet
	2.	BBZ30P080FZK	Screw 3x8
	3.	RAH-419	Cassette plate
	4.	RAC-262	Function knob R
	5.	RAC-260	Function knob P
	6.	RAC-261	Function knob S
	7.	RNH-182	Eject plate
	8.	RBH-750	Eject spring
	9.	RAC-258	Eject knob
	10.	RAC-259	Power knob
	11.	RXB-678	Door assembly
	12.	RXB-676	Front panel assembly
	13.	RAW-186	Counter
	14.	RAW-187	LED meter
	15.	RKP-544	Connector assembly 4P
	16.	PMA30P60FMC	Screw 3x6
	17.	RXB-677	Sub-panel assembly
	18.	RWS-169	Switch assembly
	19.	RAC-264	Push knob B (REC MUTE)
	20.	RAC-263	Push knob A (TAPE SELECT, DOLBY NR)
	21.	RKP-525	Connector assembly 6P
	22.	REB-458	Counter belt
	23.	RKP-574	Connector socket 5P
	24.	RKP-575	Connector socket 6P
	25.	VBZ40P080FMC	Screw 4x8
⚠ ★	26.	RTT-235	Power transformer (120V)
⚠	27.	RCG-006	Ceramic capacitor (C1, 0.01/125V)
⚠ ★★	28.	RSA-055	Power switch (S10)
⚠	29.	RYM-139	Mechanism assembly
	30.	RWX-617	Main assembly
	31.	RBH-934	REC joint D
⚠	32.	RDG-022	AC cord (UL)
		(RDG-030)	AC cord
⚠	33.	REC-376	Strain relief
	34.	REC-369	Foot assembly
	35.	REE-081	Paper
	36.	BMZ30P080FZK	Screw 3x8
	37.	RNT-025	Panel stay
	38.	RWX-615	Volume assembly
	51.		. . . . .
	52.		. . . . .
	53.		. . . . .
	54.		Connector assembly 2P
⚠	55.		Wire nut
	56.		UL cord clamper B
	57.		Power switch mounting plate
	58.		Main chassis
	59.		Bottom plate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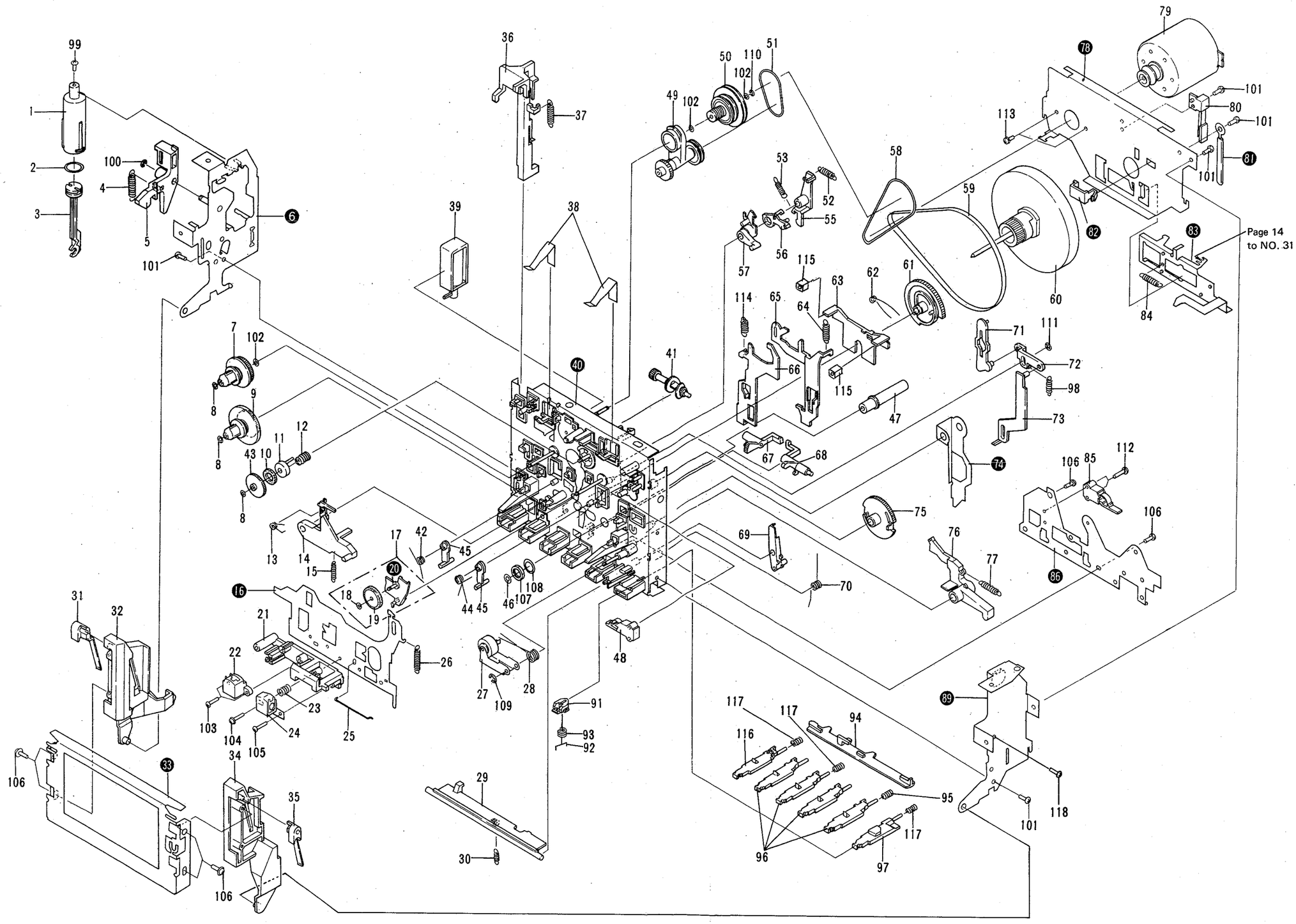

Page 14
to NO. 31

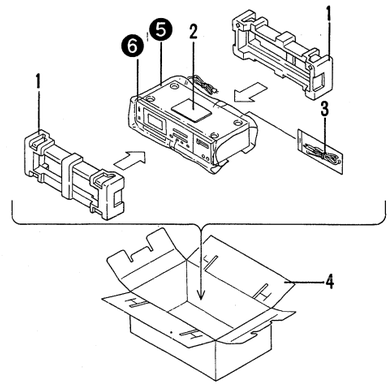
Parts List

Mark	No.	Part No.	Description
	1.	RNK-995	Cylinder
	2.	REB-447	O ring
	3.	RNL-329	Piston
	4.	RBH-871	Pocket return spring
	5.	RNL-291	Eject lever
	6.		Side plate L assembly B
★★	7.	RXB-377	Supply reel base assembly
	8.	RBF-057	Washer
★★	9.	RXB-360	TU reel base assembly
	10.	RED-194	Detector felt
	11.	RNL-318	Detector disk
	12.	RBH-885	Detector spring
	13.	RBH-873	Idler pressure spring
	14.	RNL-298	Action lever
	15.	RBH-875	Action lever spring
	16.		Head base
	17.	RXB-579	Idler arm full assembly
	18.	WA17D040D025	Washer
★★	19.	RNL-337	TU idler
	20.		Idler arm assembly
	21.	RNL-050	Sub head base
★	22.	RPB-085	Erase head
		(RPB-096)	
	23.	RBH-723	Head adjust spring
★★	24.	RPB-091	REC/PB head
		(RPB-097)	
	25.	RBH-782	HB drive spring
	26.	RBH-874	HB return spring
★★	27.	RXB-495	Pinch arm assembly
	28.	RBH-890	Pinch pressure spring
	29.	RNL-303	Lock plate
	30.	RBH-922	Lock plate spring
	31.	RNL-057	Pocket spring L
	32.	RNL-439	Pocket L
	33.		Pocket frame A
	34.	RNL-440	Pocket R
	35.	RNL-058	Pocket spring R
	36.	RNL-284	REC detector arm
	37.	RBH-883	Detector arm spring
	38.	RBK-166	Half set spring
★	39.	RXP-124	Plunger solenoid
	40.		Chassis assembly
	41.	RNL-322	Cam gear
	42.	RBH-905	Lock lever spring L
	43.	RNK-998	Idler gear
	44.	RBH-908	Lock lever spring R
	45.	RNL-285	HB lock lever
	46.	RBF-030	Oil stopper
	47.	RXB-670	Metal holder A assembly
★★	48.	RSN-034	Lever switch
	49.	RXB-577	Drive arm full assembly
	50.	RXB-580	Drive pulley assembly
★★	51.	REB-455	Drive belt B
	52.	RBH-876	Gear lever spring A
	53.	RBH-877	Gear lever spring B
	54.		. . . . .
	55.	RNL-297	Gear lever A
	56.	RNL-282	Gear lever B
	57.	RNL-296	Gear lever C
★★	58.	REB-454	Drive belt A
★★	59.	REB-453	Capstan belt
	60.	RXB-576	Flywheel assembly
	61.	RNL-288	Cam gear
	62.	RBH-879	Trigger spring
	63.	RNL-280	Brake plate
	64.	RBH-884	Action plate spring
	65.	RNL-292	FF action plate
	66.	RNL-290	REW action plate
	67.	RNL-277	Joint L
	68.	RNL-276	Joint R
	69.	RNL-281	Gear lever R
	70.	RBH-881	Trigger spring R
	71.	RNL-274	Detector lever
	72.	RNL-275	Link
	73.	RNL-289	Stop lever
	74.		REC action lever
	75.	RNL-294	Cam gear R
	76.	RNL-295	Pause lever
	77.	RBH-880	Pause lever spring
	78.		Flywheel receptacle
★★	79.	RXM-088	Motor assembly
★★	80.	RSN-025	Leaf switch
	81.		UL cord clamper
	82.		Thrust receptacle
	83.		REC action plate
	84.	RBH-882	REC return spring
★★	85.	RSN-033	Lever switch
	86.		Plate
	87.		. . . . .
	88.		. . . . .
	89.		Side plate R
	90.		. . . . .
	91.	RNL-334	Ratchet holder
	92.	RBH-870	Ratchet pin
	93.	RBH-888	Ratchet spring
	94.	RNL-486	REC connection arm
	95.	RBH-889	Button return spring
	96.	RNL-287	Function button
	97.	RNL-279	Pause button
	98.	RBH-886	Link return spring
	99.	VCZ26P090FMC	Screw
	100.	YE25FUC	Washer
	101.	VCZ26P060FMC	Screw
	102.	WA21D040D25	Washer
	103.	PMZ20P130FMC	Screw
	104.	iMZ20Y120FMC	Screw
	105.	PMZ20P120FMC	Screw
	106.	ATZ26P060FZK	Screw
	107.	NK90FUC	Nut
	108.	WG90FUC	Washer
	109.	YE20FUC	Washer
	110.	YE15FUC	Washer
	111.	YS20FBT	Washer
	112.	PMZ20P080FMC	Screw
	113.	PMA26P040FMC	Screw
	114.	RBH-916	Action plate spring L
	115.	REB-466	Brake shoe
	116.	RNL-487	REC button
	117.	RBH-909	Pause button spring
	118.	VCZ26P040FMC	Screw

8. PACKING

Parts List

Mark	No.	Part No.	Description
	1.	RHA-248	Pad
	2.	RRB-180	Operating instructions (English)
	3.	RDE-010	Connection cord
	4.	RHG-524	Packing case
	5.		Sheet C
	6.		Sheet



9. PARTS LIST

NOTES:

- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*
  Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω	*56 x 10¹*	*561*	*RD¼PS 5 6 1 J*
47kΩ	*47 x 10³*	*473*	*RD¼PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RS1P 0 1 0 K*

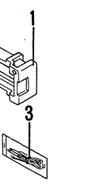
  Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ	*562 x 100*	*5621*	*RN¼SR 5 6 2 1 F*

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number , temperature, humidity, etc.

tion

plate spring L
shoe
utton
utton spring



—4

MISCELLANEOUS PARTS

P.C. BOARD ASSEMBLIES

Mark	Part No.	Symbol & Description
	RWX-617	Main assembly
	RWS-169	Switch assembly
	RWX-615	Volume assembly

OTHERS

Mark	Part No.	Symbol & Description
⚠ ★	RTT-235	Power transformer (120V)
⚠	RDG-022	AC cord
	(RDG-030)	
★★	RXM-088	Motor assembly
★★	RPB-085	Erase head
	(RPB-096)	
★★	RPB-091	REC/PB head
	(RPB-097)	
★	RXP-124	Plunger solenoid
★★	RSN-025	S8 Left switch
★★	RSN-033	S7 Lever switch
★★	RSN-034	S6 Lever switch
⚠ ★★	RSA-055	S10 Power switch
	RKP-525	Connector assembly 6P
	RKP-574	Connector socket 5P
	RKP-575	Connector socket 6P
⚠	RCG-006	C1 Ceramic capacitor (0.01/125V)

MOTHER ASSEMBLY

Main Assembly (RWX-617)

CAPACITORS

Mark	Part No.	Symbol & Description
	CCDSL 101K 500	C101, C201
	CEA R10M 50	C124, C126, C224, C226, C322
	CEA R22M 50	C139, C239
	CEA R33M 50	C123, C127, C223, C227
	CEA R47M 50	C129, C229
	CEA 010M 50	C132, C138, C232, C238, C307, C318, C320
	CEA 100M 16	C109, C110, C113, C115, C117, C119, C125, C130, C131, C137, C209, C210, C213, C215, C217, C219, C225, C230, C231, C237, C315
	CEA 220M 16	C324, C325, C330
	CEA 330M 16	C108, C208, C319, C326
	CEA 470M 16	C103, C116, C203, C216, C316
	CEA 101M 16	C304, C306
	CEA 101M 25	C303, C329
	CEA 221M 16	C328
	CEA 471M 16	C305, C314
	CEA 102M 25	C302
	CEA 102M 35	C301
	CEANL 100M 16	C105, C205
	CQMA 102K 50	C308, C309
	CQMA 182K 50	C310
	CQMA 472K 50	C121, C221
	CQMA 153K 50	C120, C122, C220, C222
	CQMA 223K 50	C311
	CQMA 104K 50	C321
	CQMA 103J 50	C111, C211
	CQMA 153J 50	C112, C212
	CQMA 273J 50	C133, C134, C233, C234
	CQMA 393J 50	C135, C235
	CQPA 332J 100	C312
	CCDSL 220K 50	C107, C207
	CCDSL 101K 50	C114, C214
	CCDSL 331K 50	C104, C204
	CCDSL 471K 50	C136, C236
	CKDYF 103Z 50	C317
	CKDYF 473Z 50	C313, C327

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before

Mark	Part No.	Symbol & Description
	RCP-150	VR101, VR201 Semi-fixed
	(RCP-195)	(22k-B)
	RCP-149	VR102, VR202, VR301, Semi-fixed
	(RCP-193)	(10k-B)
	RCP-155	VR103, VR203 Semi-fixed
	(RCP-200)	(150k-B)
⚠	RS½LF □□□J	R301, R316
	RD¼PM753JNL	R104, R204
	RD¼PM □□□J	R101, R105–R154, R201, R205–R254, R302–R315, R317–R331

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	HA11226	IC101
★★	BA338	IC301
★★	2SC2240	Q101, Q102, Q201, Q202
★★	2SC1740LN	Q103–Q106, Q108, Q109, Q203–
	(2SC2021)	Q206, Q208, Q209, Q305, Q308–
	(2SC1815)	Q310
⚠ ★★	2SD837	Q301
	(2SD1031)	
★★	2SC1740LN	Q302–Q304
	(2SC2021)	
⚠ ★★	2SC2060	Q306
	(2SC2673)	
	(2SC1383NC)	
★★	2SA933LN	Q307
	(2SA937)	
	(2SA1127NC)	
	(2SA1015)	
★	1K34A	D101, D201
	(1K60A)	
	(0A90)	
★	1S2473	D102, D202, D306–D314
	(US1040)	
⚠ ★	WL02-5004L	D301, D302
⚠ ★	1SR35-100	D303
	(W03B)	
	(W03C)	
★	1SR35-100	D304, D305
	(W03B)	
	(W03C)	
⚠ ★	WZ-135	ZD301
★	BZ-140	ZD302

COIL

Mark	Part No.	Symbol & Description	
	RTF-138	L101, L201	MPX filger
	RTF-123	L102, L202	Peaking coil
	TRF-084	L103, L203	Trap coil
	RTF-057	L301	Line coil
	RTD-026	L302	OSC coil

OTHERS

Mark	Part No.	Symbol & Description
★★	RSH-049	S301-1–S301-12 Slide switch (REC/P.B. SELECTOR)
	RKB-018	Terminal 4P (LINE)

OTHERS

Mark	Part No.	Symbol & Description
	RKN-073	S2 MIC jack
★★	RSG-138	S3–S5, S9 Push switch (TAPE SELECTOR/REC MUTE/DOLBY NR)

Volume Assembly (RWX-615)

RESISTORS, SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★	RCW-005	VR1 Variable resistor 20k-A (REC LEVEL)
★	PR5724S	LED501

Others

Mark	Part No.	Symbol & Description
	RKP-543	Connector assembly 3P
	RKP-544	Connector assembly 4P
	RKP-545	Connector assembly 7P
	RKP-546	Connector assembly 3P

Switch Assembly (RWS-169)

CAPACITORS

Mark	Part No.	Symbol & Description
	CCDSL 471K 50	C602, C603
	CKDYF 473Z50	C601

RESISTORS

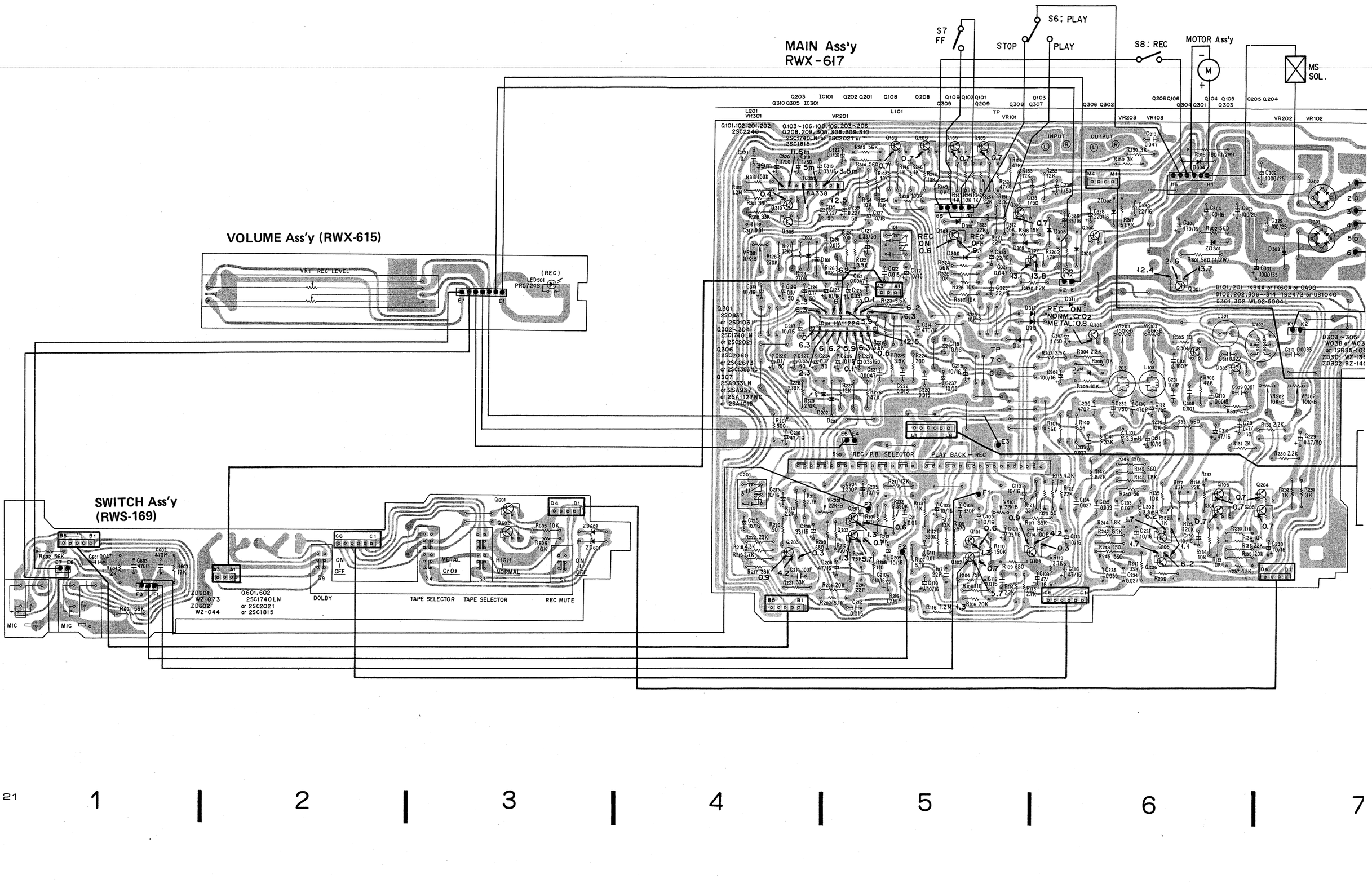
Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

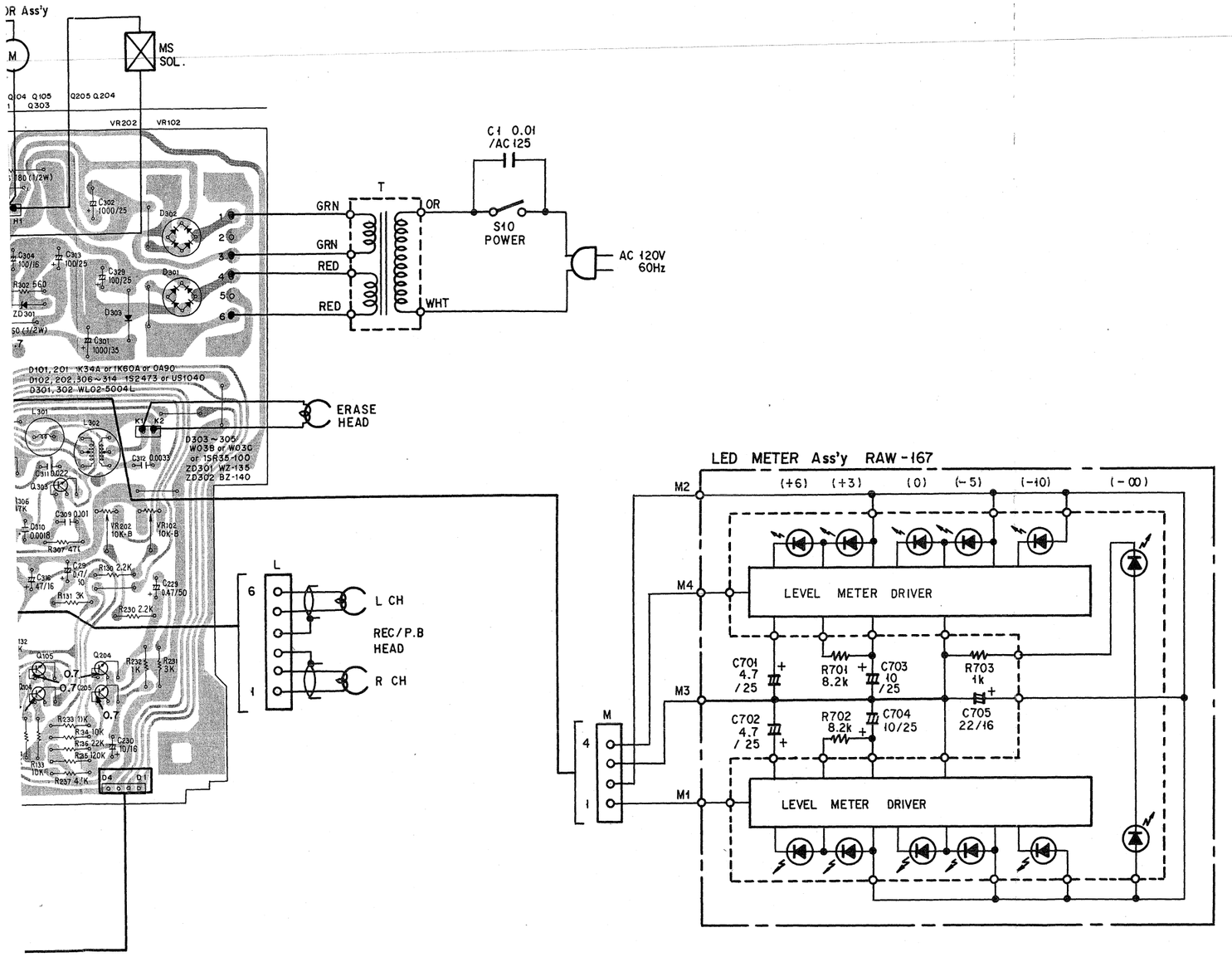
Mark	Part No.	Symbol & Description
	RD¼PM □□□J	R601–R606

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	2SC1740LN	Q601, Q602
	(2SC2021)	
	(2SC1815)	
★	WZ-073	ZD601
★	WZ-044	ZD602

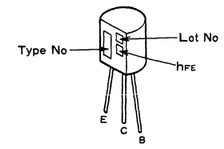
10. P.C. BOARD CONNECTION DIAGRAM



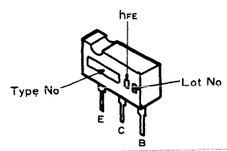


External Appearance of Transistors and ICs

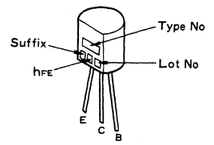
2SA1015
2SC1815
2SC2240



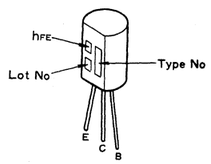
2SC2673



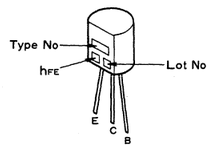
2SA933LN
2SC1740LN



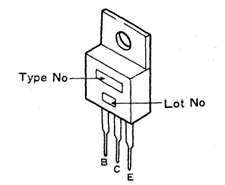
2SC1383NC



2SA1127NC



2SD1031



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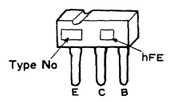
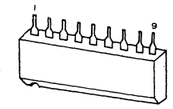
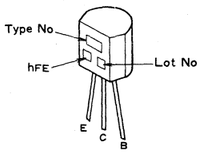
2SA937



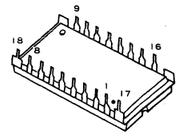
BA338



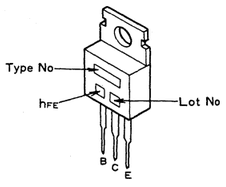
2SC2060



HA11226

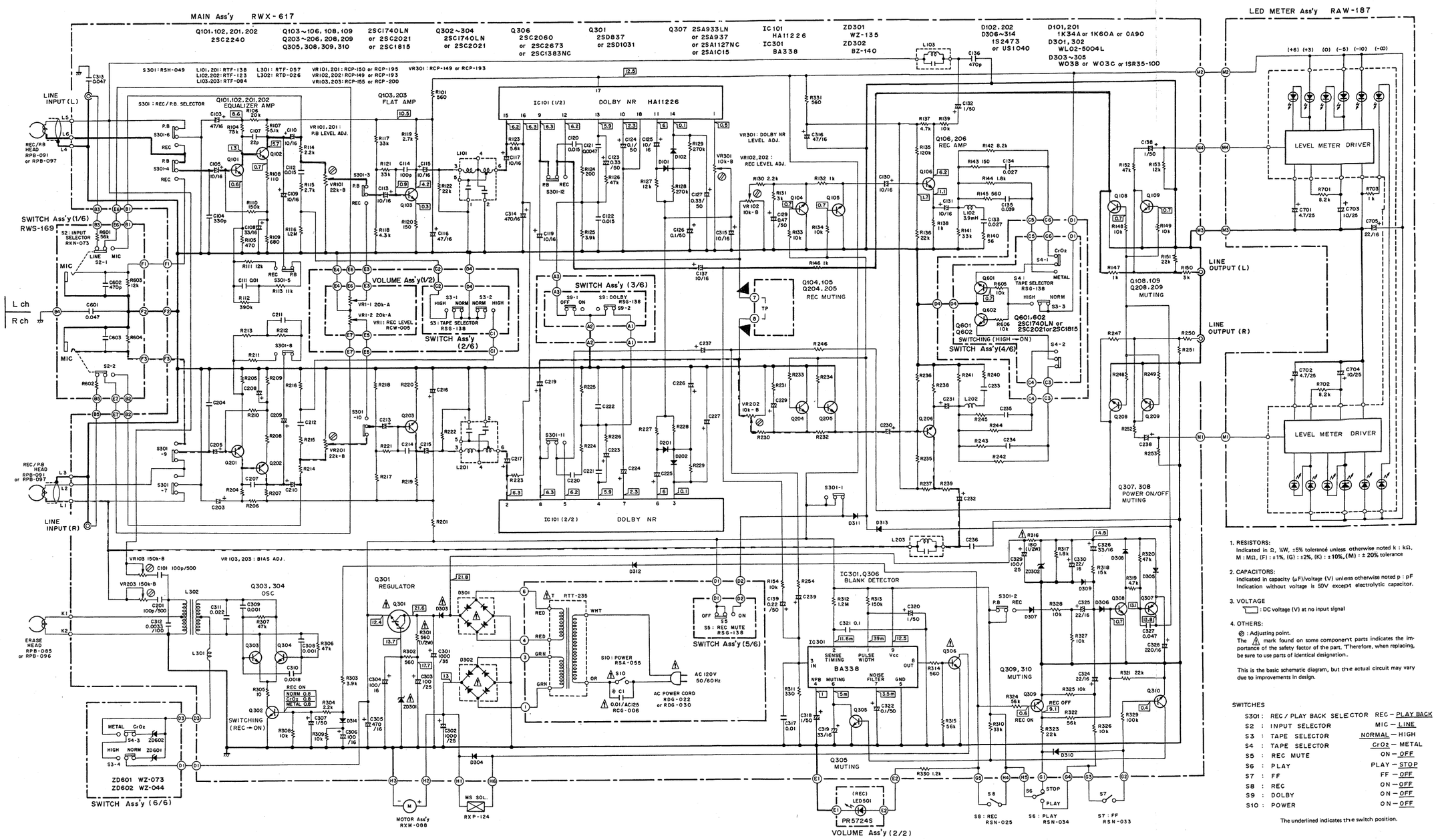


2SD837



11. SCHEMATIC DIAGRAM

NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.



◀ Measurement point
——— Playback signal route
— · — · — Recording signal route

1. RESISTORS:
Indicated in Ω, ¼W, ±5% tolerance unless otherwise noted k : kΩ, M : MΩ, (F) : ±1%, (G) : ±2%, (K) : ±10%, (M) : ± 20% tolerance

2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p : pF
Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE
: DC voltage (V) at no input signal

4. OTHERS:
⊘ : Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

SWITCHES

S301 :	REC / PLAY BACK SELECTOR	REC — PLAY BACK
S2 :	INPUT SELECTOR	MIC — LINE
S3 :	TAPE SELECTOR	NORMAL — HIGH
S4 :	TAPE SELECTOR	CrO2 — METAL
S5 :	REC MUTE	ON — OFF
S6 :	PLAY	PLAY — STOP
S7 :	FF	FF — OFF
S8 :	REC	ON — OFF
S9 :	DOLBY	ON — OFF
S10 :	POWER	ON — OFF

The underlined indicates the switch position.

12. MECHANICAL ADJUSTMENTS

Prior to adjustment

Clean the both reel base, the capstan, belts and the pinch roller with an alcohol moistened swab.

12.1 PINCH ROLLER PRESSURE ADJUSTMENT

1. Put the tape deck into the playback mode.
2. Gently push against the pinch roller arm with the tension gauge and separate the pinch roller slightly from the capstan.
3. Then the pinch roller back onto the capstan, and read the value when the pinch roller starts to rotate. If the reading fails to lie within 300g ~ 400g, replace the pinch pressure spring.

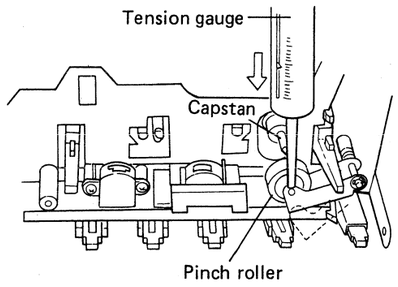


Fig. 12-1 Pinch roller pressure adjustment

12.2 REEL BASE TORQUE ADJUSTMENT

Measure the torque with the torque meter during playback, fast forward (FF) and rewind (REW) modes. The measured values should normally lie within the allowable ranges listed in the table 1.

If the measured values lie outside the relevant ranges, replace the TU (take-up) reel base assembly and/or supply reel base assembly, TU idler, or drive arm full assembly.

Table 1

	TU reel base	Supply reel base
Playback mode	35 – 55g.cm	* 2 – 5g.cm
FF mode	70 – 125g.cm	* 2 – 5g.cm
REW mode		70 – 125g.cm

** Do notes back tension torque*

12.3 TAPE SPEED ADJUSTMENT

1. Connect the frequency counter to the LINE OUTPUT terminals.
2. Play back the 3kHz portion of the STD-301 test tape. At the beginning, the frequency should be lie within the 3000Hz ~ 3010Hz range, and may be adjusted by turning the semi-fixed resistor located in the motor adjustment hole as shown in Fig. 12-2.

Tape speed is increased by turning the semi-fixed resistor clockwise, and decreased by turning counter-clockwise.

12.4 REC SWITCH ADJUSTMENT

1. Depress REC button. REC action plate moves to Ⓐ direction. At this time, check that REC switch is ON.
2. Depress the POWER switch to turn the unit OFF.
3. Depress STOP button. The REC action plate moves slightly to Ⓑ direction. At this time, bend and adjust the REC action plate so that a contact distance of REC switch is 0.2 ~ 0.5 mm.

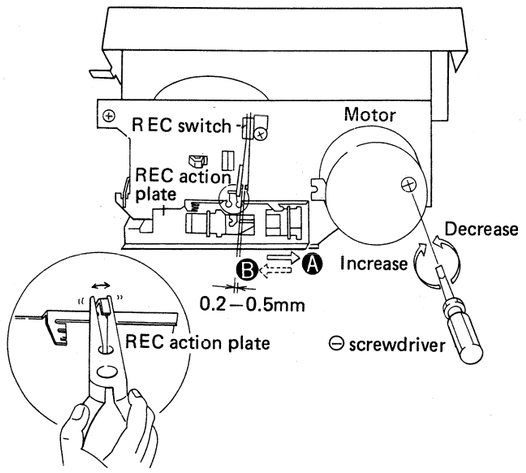


Fig. 12-2 Tape speed and REC switch adjustment

12. RÉGLAGES MÉCANIQUES

Avant de procéder au réglage

Nettoyer les deux supports de bobine, le cabestan, ceintures et le galet presseur à l'aide d'un bâtonnet imbibé d'alcool.

12.1 RÉGLAGE DE LA FORCE D'APPUI DU GALET PRESSEUR

1. Mettre la platine en mode de lecture.
2. Appuyer doucement sur le bras du galet presseur à l'aide d'une jauge de pression et séparer légèrement le galet presseur du cabestan.
3. Laisser ensuite revenir le galet presseur sur le cabestan et lire la valeur lorsque le galet presseur commence à tourner. Si la valeur lue ne se situe pas entre 300g et 400g, remplacer le ressort du galet presseur.

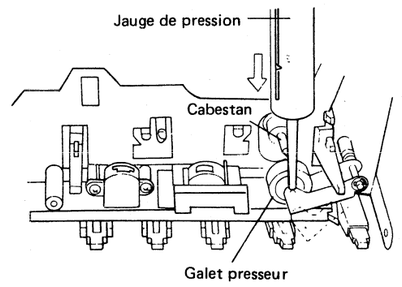


Fig. 12-1 Réglage de la force d'appui du galet presseur

12.2 RÉGLAGE DU COUPLE DU SUPPORT DE BOBINE

Mesurer le couple à l'aide d'un dynamomètre dans les modes de lecture, d'avance rapide (FF) et de rebobinage (REW). Les valeurs mesurées doivent normalement se situer dans les limites admissibles données au tableau 1.

Si les valeurs mesurées se trouvent en dehors des plages indiquées, remplacer l'ensemble support de bobine TU (réception) et/ou l'ensemble support de bobine débiteur, la poulie libre TU ou l'ensemble complet du bras d'entraînement.

Tableau 1

	Support de bobine TU	Support de bobine débitrice
Mode de lecture	35 à 55g.cm	• 2 à 5g.cm
Mode FF	70 à 125g.cm	• 2 à 5g.cm
Mode REW		70 à 125g.cm

• *Couple de tension inverse*

12.3 RÉGLAGE DE LA VITESSE DE DEFILEMENT DE LA BANDE

1. Raccorder le fréquencemètre aux bornes de sortie LINE OUTPUT.
2. Reproduire la partie à 3kHz de la bande d'essai STD-301. Au début, la fréquence doit se situer dans la plage de 3000Hz à 3010Hz, et elle peut être réglée en tournant la résistance ajustable située dans le trou de réglage du moteur, comme indiqué à la figure 12-2.

La vitesse de défilement de la bande augmente lorsque la résistance ajustable est tournée dans le sens des aiguilles d'une montre, et elle décroît lorsque l'on tourne la résistance en sens inverse.

12.4 RÉGLAGE DU COMMUTATEUR D'ENREGISTREMENT (REC)

1. Appuyer sur la touche d'enregistrement (REC). Le plaque de commande REC se déplace dans la direction Ⓐ.
2. Pour éteindre l'appareil, enfoncer l'interrupteur de courant.
3. Appuyer sur la touche d'arrêt (STOP). Le plaque de command REC se déplace légèrement dans la direction Ⓑ. Courber et ajuster alors le plaque de commande REC, de manière à ce que la course de contact du commutateur d'enregistrement soit de 0,2 à 0,5mm.

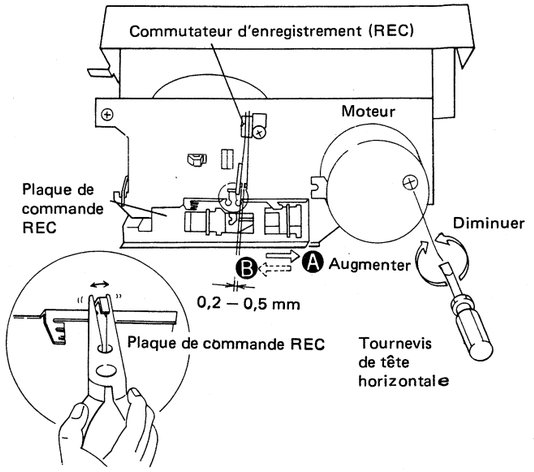


Fig. 12-2 Réglage de la vitesse de defilement de la bande et du commutateur d'enregistrement (REC)

12. AJUSTES MECÁNICOS

Antes del ajuste

Limpiar ambas bases de los carretes, eje de arrastre, cinturóns y rodillo de presión con algodón humedecido en alcohol.

12.1 AJUSTE DE LA PRESIÓN DEL RODILLO DE PRESIÓN

1. Establecer el magnetófono en el modo de reproducción.
2. Con el calibrador de tensión presionar ligeramente contra el brazo del rodillo de presión y separar un poco dicho rodillo del eje de arrastre.
3. Luego reposicionar el rodillo de presión sobre el eje de arrastre, y leer el valor en el momento en que el rodillo de presión empieza a girar. Si la indicación cae dentro de 300g ~ 400g, reemplazar el muelle del rodillo de presión.

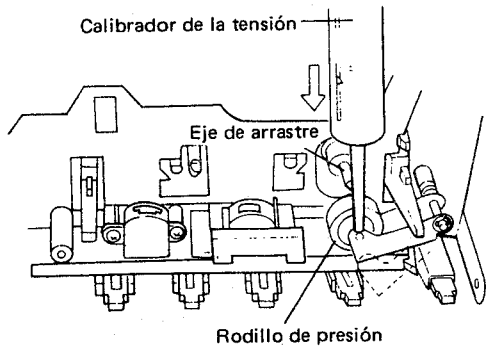


Fig. 12-1 Ajuste de la presión del rodillo de presión

12.2 AJUSTE DE LA TORSIÓN DE LA BASE DEL CARRETE

Utilizar el modidor de torsión para medir la torsión durante las funciones de reproducción, avance rápido (FF) y rebobinado (REW). Los valores medidos deberán estar normalmente dentro de los límites permisibles enumerados en la tabla 1.

Si los valores medidos no están dentro de tales límites, reemplazar el conjunto de la base del carrete de arrastre (TU) y/o conjunto de la base del carrete de suministro, rueda de guía TU, o todo el conjunto del brazo de arrastre.

Tabla 1

	Base del carrete TU	Base del carrete de suministro
Modo de reproducción	35 – 55g.cm	• 2 – 5g.cm
Modo de avance rápido	70 – 125g.cm	• 2 – 5g.cm
Modo de rebobinado		70 – 125g.cm

• *Las notas se apoyan en la torsión de la tensión*

12.3 AJUSTE DE LA VELOCIDAD DE LA CINTA

1. Conectar el frecuencímetro a los terminales de salida de línea (LINE OUTPUT).
2. Reproducir la parte de 3kHz de la cinta de prueba STD-301. Al principio, la frecuencia deberá estar entre 3000Hz ~ 3010Hz, y podrá ajustarse girando el resistor semifijo, situado en el orificio de ajuste del motor, como se muestra en la figura 12-2.

La velocidad de la cinta aumentará girando hacia la derecha el resistor semifijo, y se reducirá girándolo hacia la izquierda.

12.4 AJUSTE DEL INTERRUPTOR DE GRABACIÓN (REC)

1. Presionar el botón REC. La plancha de accionamiento de REC se mueve en la dirección Ⓐ. Entonces, comprobar que el interruptor REC esté en la posición ON.
2. Presionar el interruptor de la alimentación para desconectar el aparato.
3. Presionar el botón de parada (STOP). La plancha de accionamiento de REC se mueve ligeramente en la dirección Ⓑ. Entonces, doblar y ajustar la plancha de accionamiento de REC de modo que la distancia de contacto del interruptor REC sea de 0,2 ~ 0,5mm.

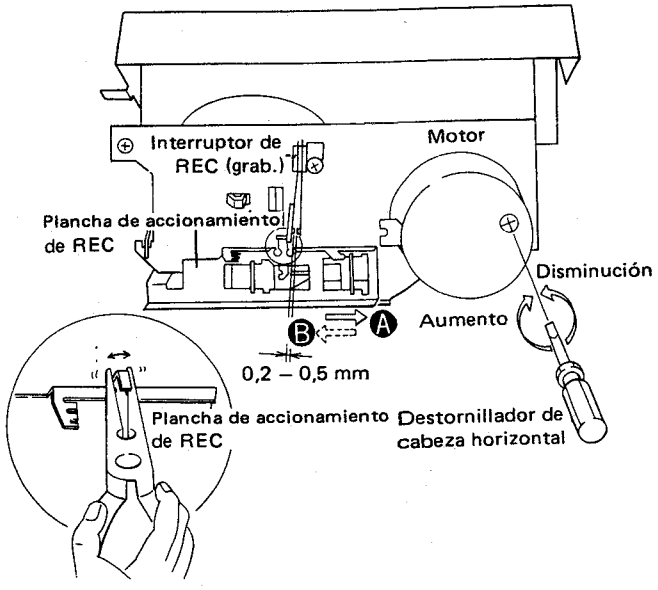


Fig. 12-2 Ajuste de la velocidad de la cinta y del interruptor de grabación (REC)

13. ELECTRICAL ADJUSTMENTS

Precaution

1. Mechanical adjustment should be completed.
2. Clean the following parts with an alcohol moistened swab: Record/Playback head, Pinch roller, Erase head, Rubber belts and Capstan.
3. Demagnetize record/playback head with a head demagnetizer.
4. Do not use magnetized screwdriver for adjustments.
5. Adjustments and measurements should be performed for both L ch and R ch with rated power supply voltage.
6. Adjustments should be performed in the order given in this service manual. Altering the order can hinder proper adjustments, resulting in loss of performance.
7. Level during measurements are based on 0dBv = 1V. Connect a 50kΩ (47 — 52kΩ) dummy resistor across the OUTPUT terminals.
8. Let the CT-330 warm up (aging) for a few minutes before proceeding with the adjustment.
9. Set the DOLBY NR switch to OFF and TAPE SELECTOR to the NORM position unless directed otherwise.

Test Equipments/Tools Required:

1. Test tape
   STD-341A ..... For playback adjustment
   STD-608A ..... NORMAL blank tape
   STD-603 ..... CrO_2 blank tape
   STD-604 ..... METAL blank tape
2. Audio oscillator
3. AC millivoltmeter (AC mV)
4. Attenuator
5. Oscilloscope
6. Resistor 50kΩ (47 — 52kΩ)

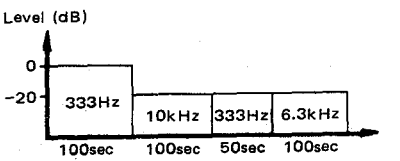


Fig. 13-1 Contents of the test tape STD-341A

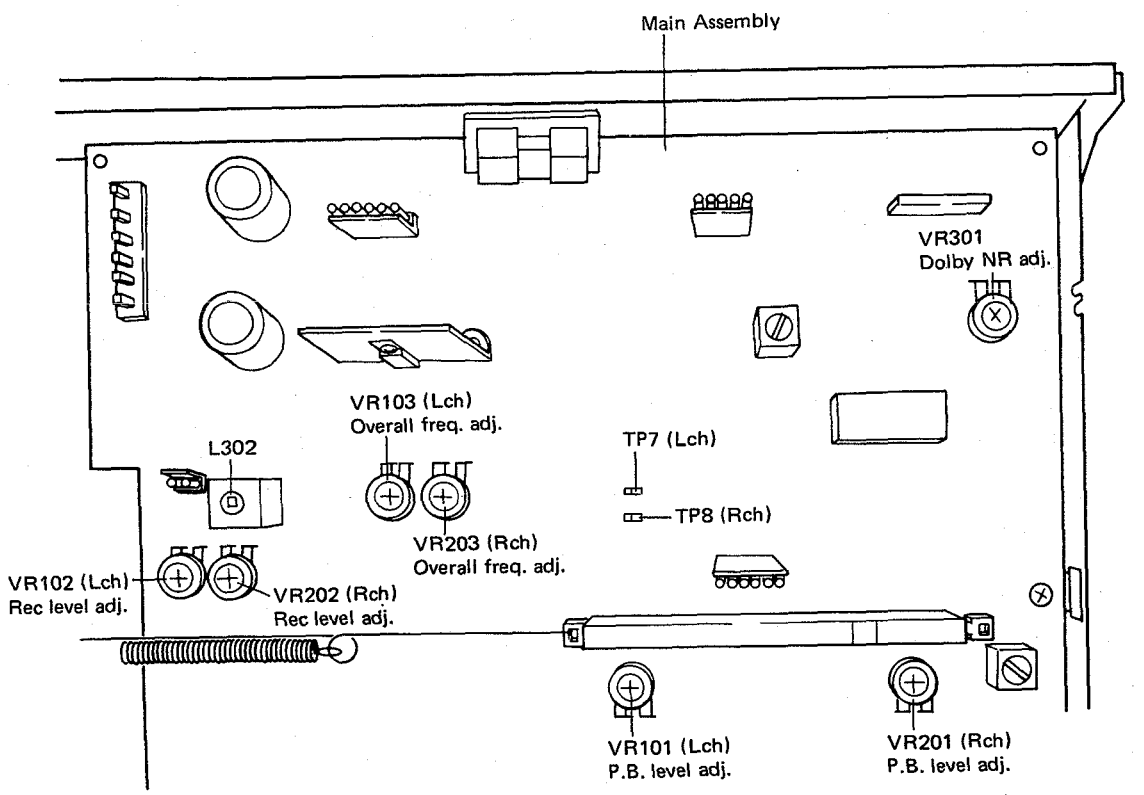


Fig. 13-2 Adjustment points

13.1 DOLBY NR ADJUSTMENT

Setting

Mode ..... Record
AC mV meter ..... TP7 (L ch) and TP8 (R ch) of the mother assembly
Input Signal ..... 2kHz, -10dBv (316 mV) to LINE INPUT

Procedure

1. Adjust the INPUT level control so that the AC mV meter reads -2.2dBv (776 mV).
2. Next change the input signal level to -30dBv (31.6 mV) and DOLBY NR switch to the ON position.
3. Adjust the VR301 so that the AC mV meter reads -17.9dBv (127 mV).

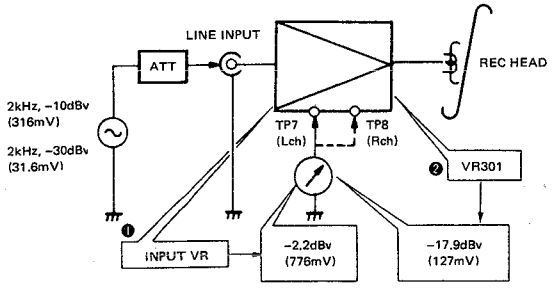


Fig. 13-3 Dolby NR adjustment

13.2 HEAD AZIMUTH ADJUSTMENT

Setting

Mode ..... Playback
Test Tape ..... STD-341A (10kHz, -20dB)
AC mV meter ..... LINE OUTPUT
VR101, VR201 ..... Turn up to maximum position

Procedure

Adjust the azimuth adjusting screw for maximum AC mV meter readings for both L and R channels. After this adjustment, lock the screw with screw lock.

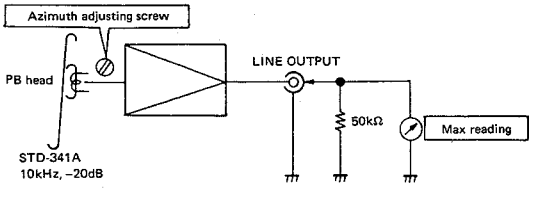


Fig. 13-4 Head azimuth adjustment

13.3 PLAYBACK EQUALIZER ADJUSTMENT

Setting

Mode ..... Playback
Test Tape ..... STD-341A (333Hz and 6.3kHz, -20dB)
AC mV meter ..... LINE OUTPUT

Procedure

1. Set the TAPE SELECTOR to the NORM position. Play back the 333Hz and 6.3kHz portions of the STD-341A, and check that difference between the two output levels does not exceed 1dB±1dB.
2. Next set the TAPE SELECTOR to the HIGH position. Play back the 333Hz and 6.3kHz portions again, and check that the difference between the two output levels does not exceed -3dB±1dB.

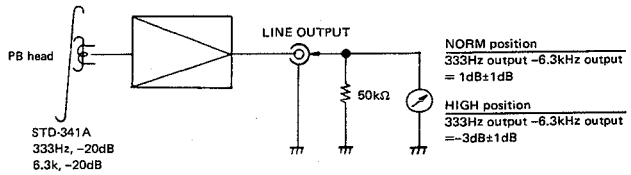


Fig. 13-5 Playback equalizer check

13.4 PLAYBACK LEVEL ADJUSTMENT

Since this adjustment determines the DOLBY NR level during playback, it should be performed precisely.

Setting

Mode ..... Playback
Test Tape STD-341A (333Hz, 0dB)
AC mV meter ..... TP7 (Lch) and TP8 (Rch)

Procedure

Adjust the VR101 (L ch) and VR201 (R ch) so that the AC mV meter reads - 1.2 dBv (0.87V).

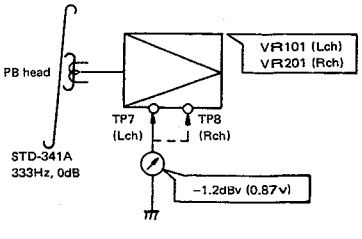


Fig. 13-6 Playback level adjustment

13.5 LEVEL METER CONFIRMATION

Setting

Mode ..... Record
Input signal ..... 333Hz, -10dBv (316mV) to LINE INPUT
AC mV meter ..... TP7 (Lch) and TP8 (Rch) of the mother assembly

Procedure

Adjust the INPUT level control so that the AC mV meter reads -4.2dBv (0.61V). Then confirm the level meter reads 0dB and "+3dB" on the level meter does not light.

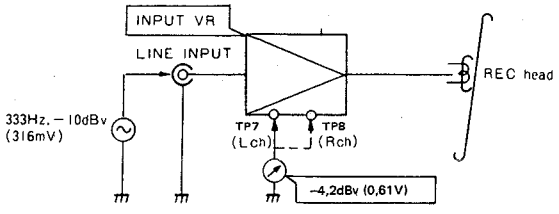


Fig. 13-7 Level meter check

13.6 OVERALL FREQUENCY RESPONSE ADJUSTMENT

Setting

Mode ..... Record
Test Tape STD-608A
AC mV meter ..... LINE OUTPUT
Input Signal ..... 333Hz, -30dBv (31.6mV) to LINE INPUT

Procedure

1. Set the TAPE SELECTOR to the NORM position.
2. Adjust the INPUT level control so that the AC mV meter reads -27dBv (44.6 mV).

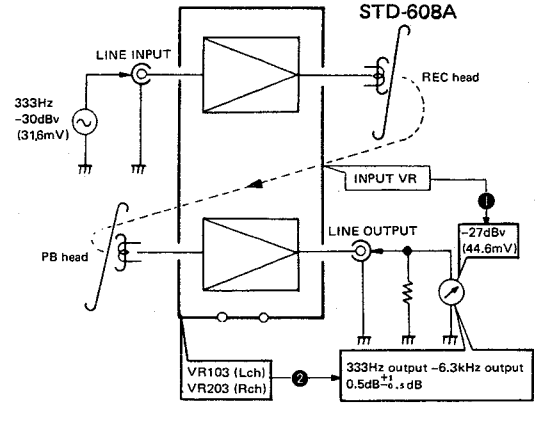


Fig. 13-8 Recording/Playback frequency response adjustment

3. Record the 333Hz and 6.3kHz signals onto the STD-608A. Play back the tape and adjust the VR103 (L ch) and VR203 (R ch) so that the difference between two is 0.5dB $^{+1}_{-0.5}$dB.

13.7 RECORD LEVEL ADJUSTMENT

Since this adjustment determines the DOLBY NR level during recording, it should be performed precisely.

Setting

Mode ..... Record
Test Tape STD-604, STD-608A, STD-603
AC mV meter ..... TP7 (Lch) and TP8 (Rch)
Input Signal ..... 333Hz, -10dBv (316mV) to LINE INPUT

Procedure

1. Set the TAPE SELECTOR to the NORM position.
2. Adjust the INPUT level control so that the AC mV meter reads -5.2dBv (0.54V).
3. Next set the DOLBY NR switch to the ON position.
4. Record the 333Hz signal onto the STD-608A. Play back the tape and adjust the VR102 (L ch) and VR202 (R ch) so that the AC mV meter reads -5.2dBv (0.54V).
5. Set the TAPE SELECTOR to the CrO_2 position and record the 333Hz signal onto the STD-603. Play back the tape and check that the AC mV meter reads -5.2dBv (0.54V) ±1.5dB.
6. Next set the TAPE SELECTOR to the METAL position and record the 333Hz signal onto the STD-604. Play back the tape and check that the AC mV meter reads -5.2dBv (0.54V) ±1.5dB.

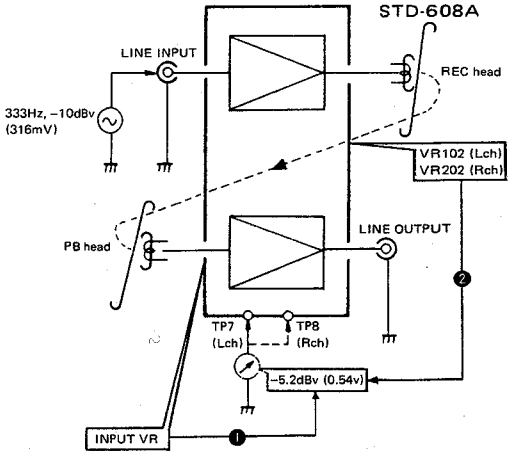
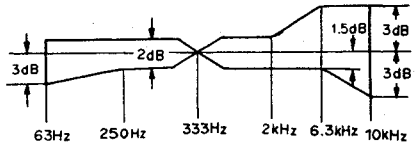


Fig. 13-9 Recording level adjustment

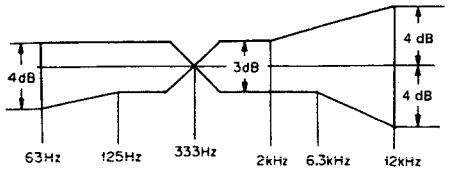
Frequency Response

Using STD-341A and the TAPE SELECTOR NORM position, with DOLBY NR OFF
However, the right channel is compensated by −1dB at 63Hz, and −0.5dB at 125Hz because of the insulation effect.

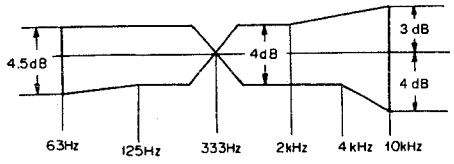


Overall Frequency Response

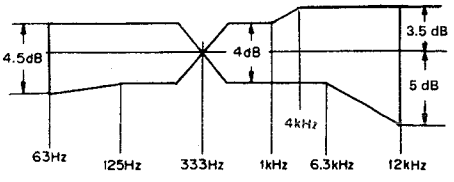
Using STD-608A and TAPE SELECTOR NORM position, with DOLBY NR OFF



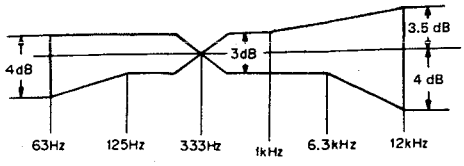
Using STD-608A and TAPE SELECTOR NORM position, with DOLBY NR ON



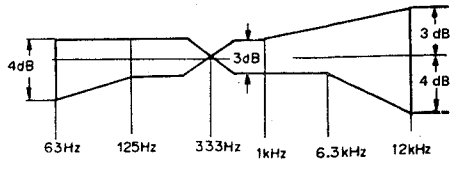
Using STD-603 and TAPE SELECTOR CrO_2 position, with DOLBY NR ON



Using STD-603 and TAPE SELECTOR CrO_2 position, with DOLBY NR OFF



Using STD-604 and TAPE SELECTOR METAL position, with DOLBY NR OFF



Using STD-604 and TAPE SELECTOR METAL position, with DOLBY NR ON

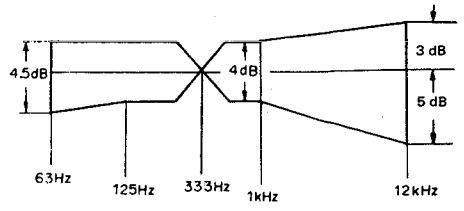


Fig. 13-10 Frequency response

13. RÉGLAGES ÉLECTRIQUES

Précautions

1. Les réglages mécaniques doivent être terminés.
2. Nettoyer les pièces suivantes à l'aide d'un bâtonnet imbibé d'alcool: tête d'enregistrement/lecture, galet presseur, tête d'effacement, courroies en caoutchouc et cabestan.
3. Démagnétiser la tête d'enregistrement/lecture à l'aide d'un démagnétiseur de tête.
4. Ne pas utiliser de tournevis magnétisé pour les réglages.
5. Les réglages et les mesures doivent être réalisés pour les canaux de gauche et de droite avec la tension d'alimentation nominale.
6. Les réglages doivent être effectués dans l'ordre indiqué dans ce manuel de service. Une modification de cet ordre peut empêcher la réalisation de réglages corrects et peut provoquer une baisse de performance.
7. Les niveaux en cours de mesure sont basés sur 0dBv = 1V. Raccorder une charge fictive de 50 kΩ (47 à 52 kΩ) entre les bornes de sortie (OUTPUT).
8. Laisser chauffer (vieillissement) le CT-330 pendant quelques minutes avant de procéder aux réglages.
9. Placer le commutateur DOLBY NR sur OFF et le sélecteur TAPE SELECTOR sur la position NORM, sauf indication contraire.

Equipements/outils d'essai requis

1. Bande d'essai
   - STD-341A ..... Pour le réglage de la reproduction
   - STD-608A ..... Bande "NORMAL" vierge
   - STD-603 ..... Bande "CrO2" vierge
   - STD-604 ..... Bande "METAL" vierge
2. Oscillateur BF
3. Millivoltmètre alternatif (mV CA)
4. Atténuateur
5. Oscilloscope
6. Résistance 50 kΩ (47 à 52 kΩ)

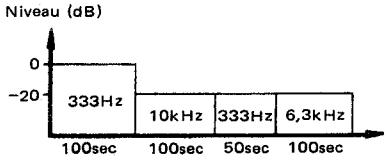


Fig. 13-1 Contenu de la bande d'essai STD-341A

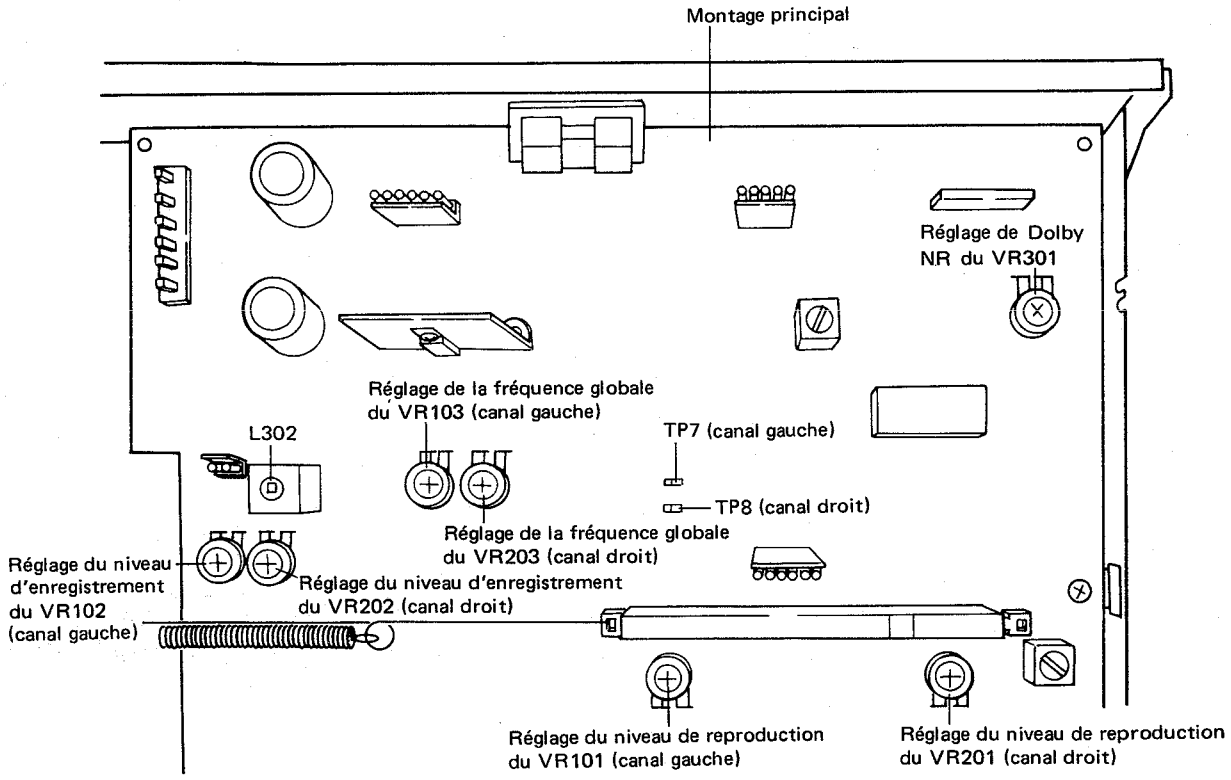

Montage principal
Réglage de Dolby NR du VR301
Réglage de la fréquence globale du VR103 (canal gauche)
L302
TP7 (canal gauche)
TP8 (canal droit)
Réglage de la fréquence globale du VR203 (canal droit)
Réglage du niveau d'enregistrement du VR102 (canal gauche)
Réglage du niveau d'enregistrement du VR202 (canal droit)
Réglage du niveau de reproduction du VR101 (canal gauche)
Réglage du niveau de reproduction du VR201 (canal droit)

Fig. 13-2 Points de réglage

13.1 RÉGLAGE DU CIRCUIT DOLBY NR

Préparation

Mode ..... Enregistrement
Millivoltmètre CA ..... TP7 (canal de gauche "L") et TP8 (canal de droite "R") de l'ensemble principal
Signal d'entrée ..... 2kHz, -10dBv (316mV) à LINE INPUT

Procédure

1. Régler la commande de niveau d'entrée INPUT de manière à ce que le millivoltmètre CA indique -2,2dBv (776mV).
2. Faire ensuite passer le niveau du signal d'entrée à -30dBv (31,6mV) et placer le commutateur DOLBY NR sur la position ON.
3. Régler VR301 de manière à ce que le millivoltmètre CA indique -17,9dBv (127mV).

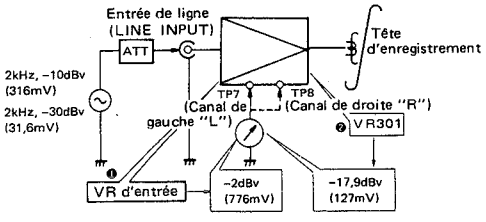


Fig. 13-3 Réglage du circuit Dolby NR

13.2 RÉGLAGE EN AZIMUT DE LA TÊTE

Préparation

Mode ..... Lecture
Bande d'essai ..... STD-341A (10kHz, -20dB)
Millivoltmètre CA ..... A la sortie de ligne (LINE OUTPUT)
VR101, VR201 ..... Tournées en position maximum

Procédure

Régler la vis de réglage d'azimut de manière à obtenir l'indication maximum du millivoltmètre CA pour les canaux de gauche et de droite. Lorsque ce réglage est terminé, verrouiller la vis à l'aide du blocage de vis.

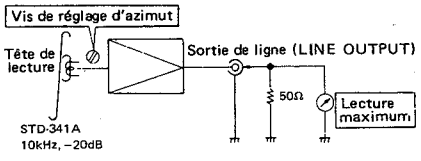


Fig. 13-4 Réglage d'azimut de la tête

13.3 RÉGLAGE DE L'ÉGALISATION DE LECTURE

Préparation

Mode ..... Lecture
Bande d'essai ..... STD-341A (333Hz et 6,3kHz, -20dB)
Millivoltmètre CA ..... Sortie de ligne (LINE OUTPUT)

Procédure

1. Placer le sélecteur de bande TAPE SELECTOR sur la position NORM. Procéder à la reproduction des passages de 333Hz et de 6,3kHz de la bande STD-341A et vérifier que la différence entre les deux niveaux de sortie n'excède pas 1dB±1dB.
2. Placer ensuite le sélecteur TAPE SELECTOR sur la position HIGH. Procéder de nouveau à la reproduction des passages de 333Hz et de 6,3kHz et vérifier que la différence entre les deux niveaux de sortie n'excède pas -3dB± 1dB.

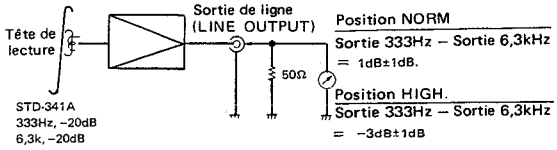


Fig. 13-5 Contrôle de l'égalisation de lecture

13.4 RÉGLAGE DU NIVEAU DE LECTURE

Ce réglage déterminant le niveau de DOLBY NR pendant la lecture, il doit être réalisé avec précision.

Préparation

Mode ..... Lecture
Bande d'essai STD-341A (333Hz, 0dB)
Millivoltmètre CA ..... TP7 (canal de gauche "L") et TP8 (canal de droite "R")

Procédure

Régler VR101 (canal de gauche) et VR201 (canal de droite), de manière à ce que le millivoltmètre CA indique -1,2dBv (0,87V).

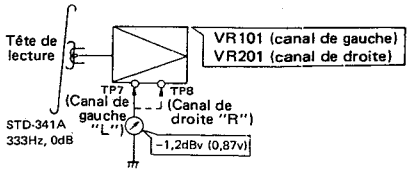


Fig. 13-6 Réglage du niveau de lecture

13.5 CONFIRMATION DE L'INDICATEUR DE NIVEAU

Préparation

Mode ..... Enregistrement
Signal d'entrée ..... 333Hz, - 10dBv (316mV) à l'entrée de ligne LINE INPUT
Millivoltmètre CA ..... TP7 (canal de gauche) et TP8 (canalde droite) de l'ensemble principal

Procédure

Régler la commande de niveau d'entrée INPUT de manière à ce que le millivoltmètre CA indique - 4,2dBv (0,61V). Puis, s'assurer que l'indicateur de niveau est à 0dB et que le signal "+3dB" ne s'allume pas sur l'indicateur de niveau.

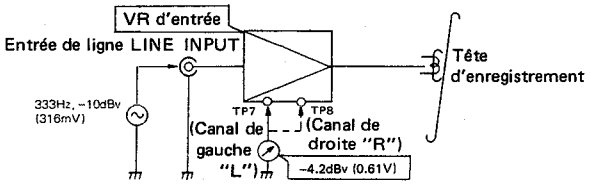


Fig. 13-7 Contrôle de l'indicateur de niveau

13.6 RÉGLAGE DE LA RÉPONSE EN FRÉQUENCE GLOBALE

Préparation

Mode ..... Enregistrement
Bande d'essai STD-608A
Millivoltmètre CA ..... Sortie de ligne LINE OUTPUT
Signal d'entrée ..... 333Hz, - 30dBv (31,6mV) à l'entrée de ligne LINE INPUT

Procédure

1. Placer le sélecteur de bande TAPE SELECTOR sur la position NORM.
2. Régler la commande de niveau d'entrée INPUT de manière à ce que le millivoltmètre CA indique - 27dBv (44,6mV).

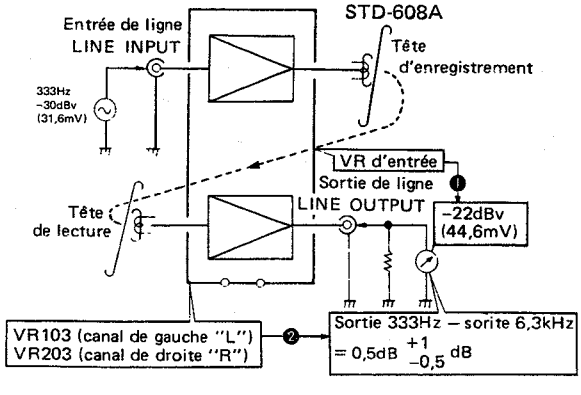


Fig. 13-8 Réglage de la réponse en fréquence enregistrement/lecture

3. Enregistrer les signaux à 333Hz et à 6,3kHz sur STD-608A. Lire la bande et régler VR103 (canal de gauche) et VR203 (canal de droite) de manière à ce que la différence entre les deux soit de 0,5 dB $^{+1}_{-0,5}$ dB.

13.7 RÉGLAGE DU NIVEAU D'ENREGISTREMENT

Ce réglage déterminant le niveau de DOLBY NR pendant l'enregistrement, il doit être réalisé avec précision.

Préparation

Mode ..... Enregistrement
Bande d'essai STD-604, STD-608A, STD-603
Millivoltmètre CA ..... TP7 (canal de gauche "L") et TP8 (canal de droite "R")
Signal d'entrée ..... 333Hz, - 10dBv (316mV) à l'entrée de ligne LINE INPUT

Procédure

1. Placer le sélecteur de bande TAPE SELECTOR sur la position NORM.
2. Régler la commande de niveau d'entrée INPUT de manière à ce que le millivoltmètre CA indique - 5,2dBv (0,54V).
3. Placer ensuite le commutateur DOLBY NR sur la position ON (enclenché).
4. Enregistrer le signal de 333Hz sur la bande STD-608A. Lire la bande et régler VR102 (canal de gauche) et VR202 (canal de droite) de manière à ce que le millivoltmètre CA indique - 5,2dBv (0,54V).
5. Placer le sélecteur de bande TAPE SELECTOR sur la position CrO2 et enregistrer le signal de 333Hz sur la bande STD-603. Lire la bande et vérifier que le millivoltmètre CA indique - 5,2dBv (0,54V) ±1,5dB.
6. Placer ensuite le sélecteur de bande TAPE SELECTOR sur la position METAL et enregistrer le signal de 333Hz sur la bande STD-604. Lire la bande et vérifier que le millivoltmètre CA indique - 5,2dBv (0,54V) ±1,5dB.

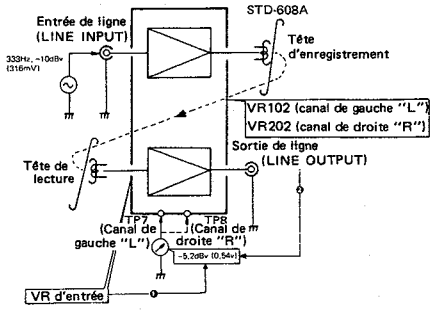
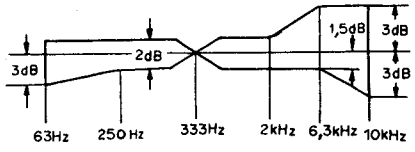


Fig. 13-9 Réglage du niveau d'enregistrement

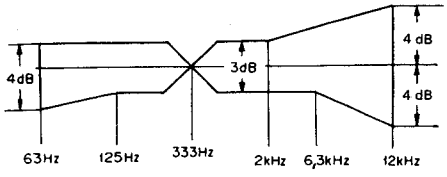
Réponse en fréquence

Utilisation de STD-341A avec TAPE SELECTOR sur la position NORM et le circuit DOLBY NR hors service (OFF)
Le canal de droite est compensé de -1dB à 63Hz et de -0,5dB à 125Hz, à cause de l'effet d'isolement

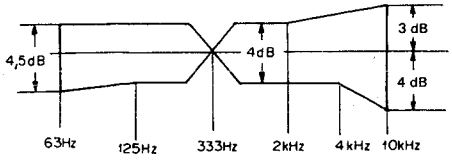


Réponse en frérquence globale

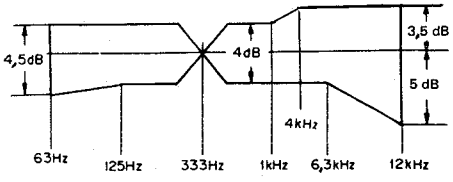
Utilisation de STD-608A avec TAPE SELECTOR sur la position NORM et le circuit DOLBY NR hors service (OFF)



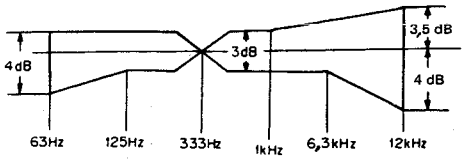
Utilisation de STD-608A avec TAPE SELECTOR sur la position NORM et le circuit DOLBY NR en service (ON)



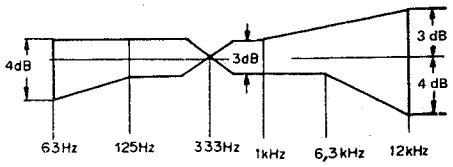
Utilisation de STD-603 avec TAPE SELECTOR sur la position CrO2 et le circuit DOLBY NR en service (ON)



Utilisation de STD-603 avec TAPE SELECTOR sur la position CrO2 et le circuit DOLBY NR hors service (OFF)



Utilisation de STD-604 avec TAPE SELECTOR sur la position METAL et le circuit DOLBY NR hors service (OFF)



Utilisation de STD-604 avec TAPE SELECTOR sur la position METAL et le circuit DOLBY NR en service (ON)

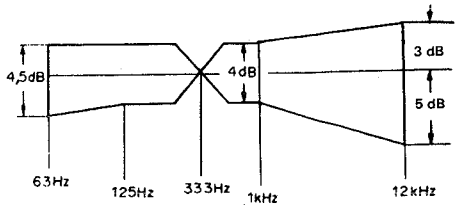


Fig. 13-10 Réponse en fréquence

13. AJUSTES ELÉCTRICOS

Precauciones

1. Deberán completarse los ajustes mecánicos.
2. Limpiar las partes siguientes con algodón humedecido en alcohol: cabeza de grabación/reprodución, rodillo de arrastre, cabeza de borrado, correas de goma y eje de arrastre.
3. Desmagnetizar la cabeza de grabación/reproducción con un desmagnetizador de cabezas.
4. No utilizar destornilladores magnetizados para los ajustes.
5. Los ajustes y las mediciones deberán realizarse para la tensión nominal de suministro de los canales izquierdo y derecho.
6. Los ajustes deberán realizarse en el orden dado en este manual de servicio. Si se altera el orden los ajustes pueden resultar inútiles, dando como resultado una pérdida de rendimiento.
7. El nivel durante las mediciones se basa en 0dBv = 1V. Conectar un resistor fícticio de 50Kohmios (47 ~ 52Kohmios) a los terminales de salida (OUTPUT).
8. Dejar que el CT-330 se precaliente durante algunos minutos antes de proceder con el ajuste.
9. Poner el interruptor de reducción de ruido Dolby (DOLBY NR) en la posición OFF y el selector de cintas (TAPE SELECTOR) en la posición NORM a menos de que se diga otra cosa.

Equipos/herramientas de pruebas requeridos:

1. Cinta de prueba
   - STD-341A ..... para el ajuste de reproducción
   - STD-608A ..... cinta NORMAL en blanco
   - STD-603 ..... cinta CrO_2 en blanco
   - STD-604 ..... cinta de METAL en blanco
2. Oscilador sonoro
3. Milivoltímetro de CA (AC mV)
4. Atenuador
5. Osciloscopio
6. Resistor de 50Kohmios (47 ~ 52Kohmios)

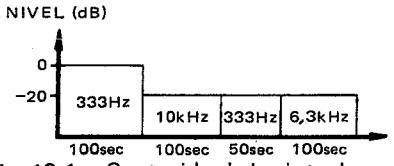


Fig. 13-1 Contenido de la cinta de prueba STD-341A

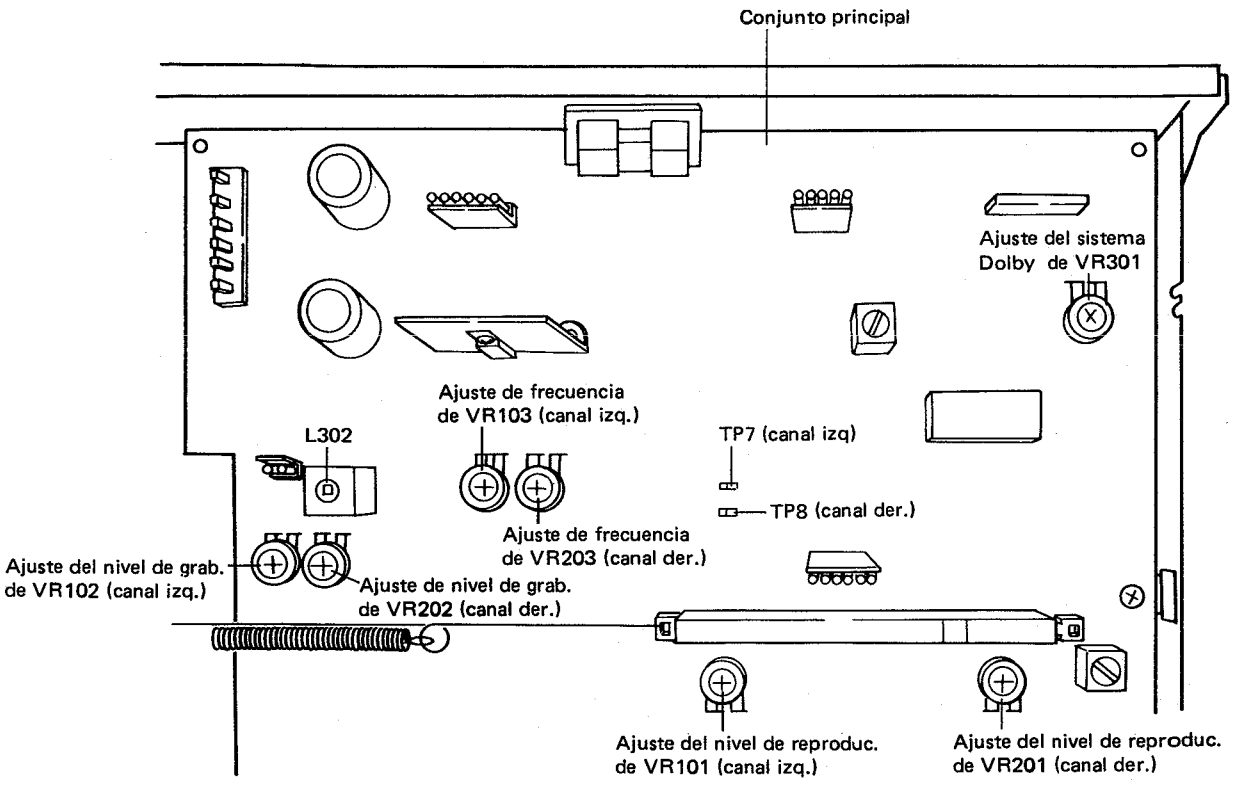

Conjunto principal
Ajuste del sistema Dolby de VR301
Ajuste de frecuencia de VR103 (canal izq.)
L302
TP7 (canal izq)
TP8 (canal der.)
Ajuste de frecuencia de VR203 (canal der.)
Ajuste del nivel de grab. de VR102 (canal izq.)
Ajuste de nivel de grab. de VR202 (canal der.)
Ajuste del nivel de reproduc. de VR101 (canal izq.)
Ajuste del nivel de reproduc. de VR201 (canal der.)

Fig. 13-2 Puntos de ajuste

13.1 AJUSTE DEL SISTEMA DOLBY

Ajuste

Mode ..... grabación
Milivoltímetro de CA ... TP7 (canal izq.) y TP8 (canal der.) del conjunto principal.
Señal de entrada ..... 2kHz, - 10dBv (316mV) a LINE INPUT

Procedimiento

1. Ajustar el control del nivel de entrada (INPUT) de modo que el milivoltímetro de CA indique - 2,2dBv (776mV).
2. Luego, cambiar el nivel de la señal de entrada a - 30dBv (31,6mV) y el interruptor DOLBY NR a la posición ON.
3. Ajustar la VR301 de modo que el milivoltímetro de CA indique - 17,9dBv (127mV).

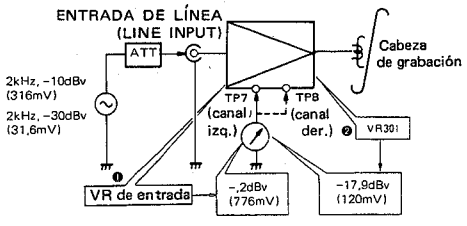


Fig. 13-3 Ajuste del sistema Dolby

13.2 AJUSTE DEL ACIMUT DE LA CABEZA

Ajuste

Modo ..... reproducción
Cinta de prueba ..... STD-341A (10kHz, - 20dB)
Milivoltímetro de CA ... LINE OUTPUT
VR101, VR201 ..... incrementar a la posición máxima

Procedimiento

Ajustar el tornillo de ajuste del acimut para que el milivoltímetro de CA ofrezca las lecturas máximas de los canales izquierdo y derecho. Después de este ajuste, enclavar el tornillo con el bloqueador del tornillo.

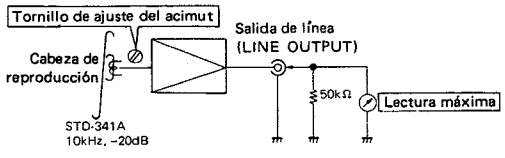


Fig. 13-4 Ajuste de acimut de la cabeza

13.3 AJUSTE DEL ECUALIZADOR DE REPRODUCCIÓN

Ajuste

Modo ..... reproducción
Cinta de prueba ..... STD-341A (333Hz y 6,3kHz, - 20dB)
Milivoltímetro de CA ... LINE OUTPUT

Procedimiento

1. Poner el selector de cintas (TAPE SELECTOR) en la posición NORM. Reproducir las partes de 333Hz y 6,3kHz de la STD-341A, y comprobar la diferencia entre los dos niveles de salida no exceda de 1,0dB±1dB.
2. Luego, poner el selector de cintas (TAPE SELECTOR) en la posición HIGH. Reproducir de nuevo las partes de 333Hz y 6,3kHz, y comprobar que la diferencia entre los dos nivele de salida no excedande - 3dB±1dB.

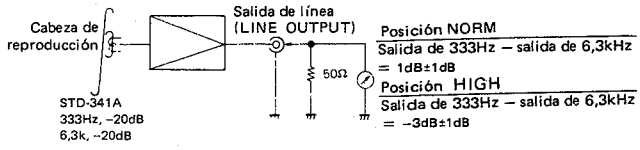


Fig. 13-5 Comprobación del ecualizador de reproducción

13.4 AJUSTE DEL NIVEL DE REPRODUCCION

Puesto que este ajuste determina el nivel del sistema Dolby durante la reproducción, deberá realizarse con precisión.

Ajuste

Modo ..... reproducción
Cinta de prueba STD-341A (333Hz, 0dB)
Milivoltímetro de CA ... TP 7 (canal izq.) y TP8 (canal der.)

Procedimiento

Ajustar la VR101 (canal izquierdo) y la VR201 (canal derecho) de modo que el milivoltímetro de CA indique - 1,2dBv (0,87V).

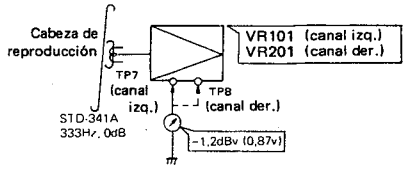


Fig. 13-6 Ajuste del nivel de reproducción

13.5 CONFIRMACIÓN DEL MEDIDOR DE NIVEL

Ajuste

Modo ..... grabación
Señal de entrada ..... 333Hz, - 10dBv (316mV) a LINE INPUT
Milivoltímetro de CA ... TP7 (canal izq.) y TP8 (canal der.) del conjunto principal

Procedimiento

Ajustar el control del nivel de entrada (INPUT) de modo que el milivoltímetro de CA indique - 4,2dBv (0,61V). Luego, confirmar entonces que el medidor de nivel indique 0dB y que "+3dB" del medidor de nivel no se ilumine.

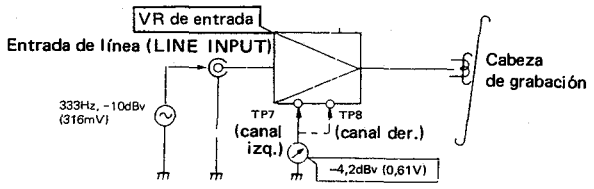


Fig. 13-7 Comprobación del medidor de nivel

13.6 AJUSTE GENERAL DE LA RESPUESTA EN FRECUENCIA

Ajuste (31,6mV)

Modo ..... grabación
Cinta de prueba STD-608A
Milivoltímetro de CA ... LINE OUTPUT
Señal de entrada ..... 333Hz, - 30dBv (31,6mV) a LINE INPUT

Procedimiento

1. Poner el selector de cintas (TAPE SELECTOR) en la posición NORM.
2. Ajustar el control del nivel de entrada (INPUT) de modo que el milivoltímetro de CA indique - 27dBv (44,6mV).

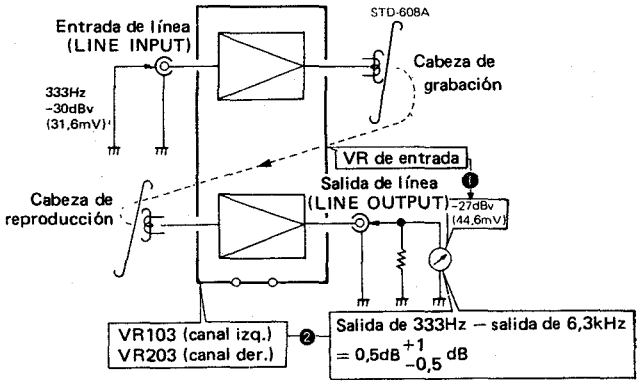

Entrada de línea (LINE INPUT)
STD-608A
Cabeza de grabación
333Hz -30dBv (31,6mV)
VR de entrada
Salida de línea (LINE OUTPUT)
-27dBv (44,6mV)
Cabeza de reproducción
VR103 (canal izq.) VR203 (canal der.)
Salida de 333Hz — salida de 6,3kHz = 0,5dB +1 -0,5 dB

Fig. 13-8 Ajuste grabación/reproducción de la respuesta en frecuencia

3. Grabar las señales de 333Hz y 6,3kHz de la STD-608A. Reproducir la cinta y ajustar la VR103 (canal izquierdo) y VR203 (canal derecho) de modo que la diferencia entre las dos sea de 0,5dB $^{+1}_{-0,5}$dB.

13.7 AJUSTE DEL NIVEL DE GRABACIÓN

Puesto que este ajuste determina el nivel del sistema Dolby durante la grabación, deberá realizarse con precisión.

Ajuste

Modo ..... grabación
Cinta de prueba STD-604, STD-608A, STD-603
Milivoltímetro de CA ... TP 7 (canal izq.) y TP8 (canal der.)
Señal de entrada ..... 333Hz, - 10dBv (316mV) a LINE INPUT

Procedimiento

1. Poner el selector de cintas (TAPE SELECTOR) en la posición NORM.
2. Ajustar el control del nivel de entrada (INPUT) de modo que el milivoltímetro de CA indique - 5,2dBv (0,54V).
3. Luego, poner el interruptor del sistema Dolby (DOLBY NR) en la posición ON.
4. Grabar la señal de 333Hz en la STD-608A. Reproducir la cinta y ajustar la VR102 (canal izquierdo) y la VR202 (canal derecho) de modo que el milivoltímetro de CA indique - 5,2dBv (0,54V).
5. Poner el selector de cinta (TAPE SELECTOR) en la posición CrO_2 y grabar la señal de 333Hz en la STD-603. Reproducir la cinta y verificar que el milivoltímetro de CA indique - 5,2dBv (0,54V) ±1,5dB.
6. Luego, poner el selector de cintas (TAPE SELECTOR) en la posición METAL y grabar la señal de 333Hz en la STD-604. Reproducir la cinta y verificar que el milivoltímetro de CA indique - 5,2dBv (0,54V) ±1,5dB.

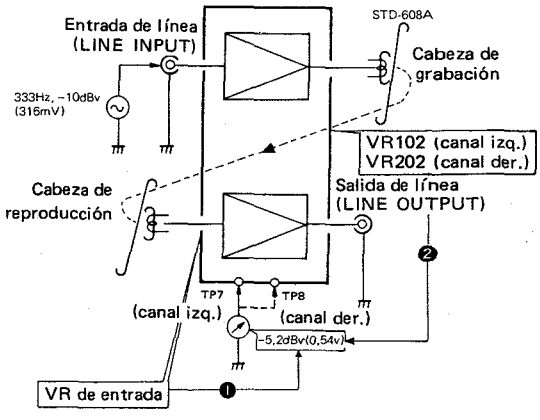
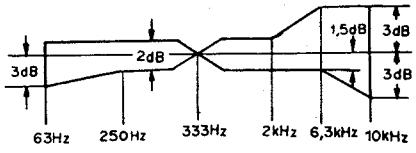


Fig. 13-9 Ajuste del nivel de grabación

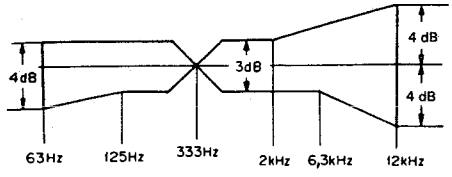
Respuesta en frecuencia

Empleando la STD-341A y el selector de cintas (TAPE SELECTOR) en la posición NORM con el sistema Dolby (DOLBY NR) en la posición OFF
Sin embargo, se compensa el canal derecho en -1dB a 63Hz, y -0,5dB a 125Hz debido al efecto aislante

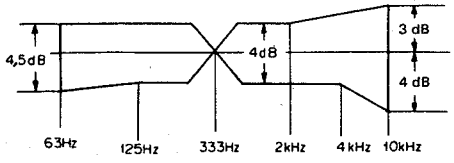


Respuesta en frecuencia general

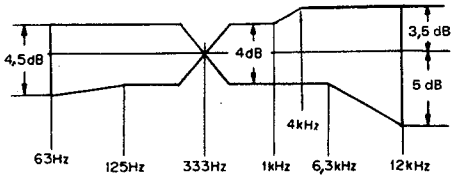
Utilizando el STD-608A y la posición NORM del selector de cintas (TAPE SELECTOR) con el sistema DOLBY NR en la posición OFF.



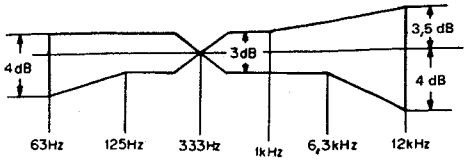
Utilizando el STD-608A y la posición NORM del selector de cintas (TAPE SELECTOR) con el sistema DOLBY NR en la posición ON.



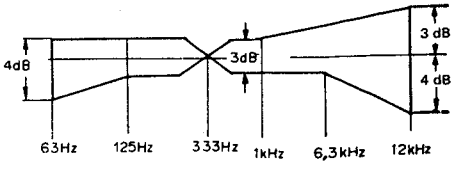
Utilizando el STD-603 y la posición CrO_2 del selector de cintas (TAPE SELECTOR) con el sistema DOLBY NR en el posición ON.



Utilizando el STD-603 y la posición CrO_2 del selector de cintas (TAPE SELECTOR) con el sistema DOLBY NR en la posición OFF.



Utilizando el STD-604 y la posición METAL del selector de cintas (TAPE SELECTOR) con el sistema DOLBY NR en la posición OFF.



Utilizando el STD-604 y la posición METAL del selector de cintas (TAPE SELECTOR) con el sistema DOLBY NR en la posición ON.

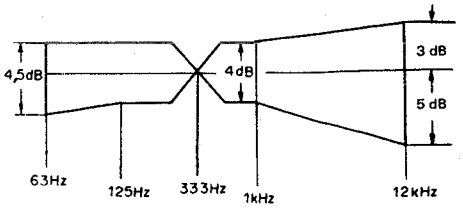


Fig. 13-10 Respuesta en frecuencia

14. FOR THE HE, HB, HP AND D TYPES

14.1 SPECIFICATIONS

The specifications for the CT-330/HE, HB, HP and D types are the same as the CT-330/KU type except for following sections.

Miscellaneous

Power Requirements
HE, HB and HP types AC220V, 240V 50/60Hz
D type . . . . . AC120V, 220V and 240V 50/60Hz

14.2 CONTRAST OF MISCELLANEOUS PARTS

NOTES:
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★.
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

CT-330/HE, HB, HP and D types are the same as the CT-330/KU type with the exception of following sections.

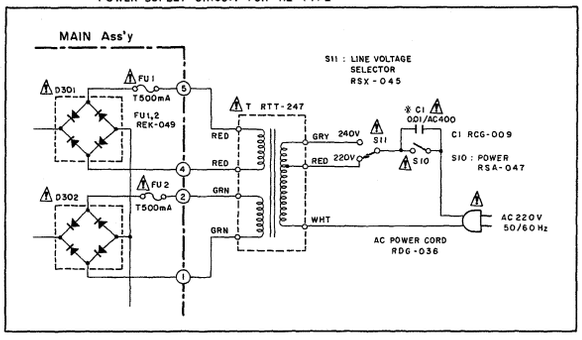
Mark		Symbol & Description		Part No.				
				KU type	HE type	HB type	HP type	D type
⚠	★		Power transformer (120V)	RTT-235	. . . . .	. . . . .	. . . . .	. . . . .
⚠	★		Power transformer (220V, 240V)	. . . . .	RTT-247	RTT-247	RTT-247	. . . . .
⚠	★		Power transformer (120V, 220V, (240V)		. . . . .	. . . . .	. . . . .	RTT-264
⚠			AC cord	RDG-022 (RDG-030)	RDG-036	RDG-032	RDG-029	RDG-039
⚠	★★	S11	Line voltage selector switch	. . . . .	RSX-045	RSX-045	RSX-045	. . . . .
⚠	★★		Line voltage selector socket	. . . . .	. . . . .	. . . . .	. . . . .	RKR-020
⚠	★★	S10	Power switch	RSA-055	RSA-047	RSA-047	RSA-047	RSA-045
⚠		C1	Ceramic capacitor (0.01/125V)	RCG-006	. . . . .	. . . . .	. . . . .	. . . . .
⚠		C1	Ceramic capacitor (0.01/400V)	. . . . .	RCG-009	RCG-009	RCG-009	. . . . .
⚠		C1	Ceramic capacitor (0.01/250V)	. . . . .	. . . . .	. . . . .	. . . . .	RCG-008
⚠	★★	FU1, FU2	Fuse T500mA	. . . . .	REK-049	REK-049	REK-049	. . . . .
⚠	★★	FU1	Fuse 1A	. . . . .	. . . . .	. . . . .	. . . . .	REK-051
⚠			Terminal strip	. . . . .	RKC-060	RKC-060	RKC-060	. . . . .
			Packing case	RHG-524	RHG-525	RHG-525	RHG-525	RHG-526
			Operating instructions (English)	RRB-180	. . . . .	RRB-182	RRB-182	RRB-182
			Operating instructions (German)	. . . . .	. . . . .	. . . . .	. . . . .	RRD-058
			Operating instructions (English/German/Italian/French)	. . . . .	RRE-023	. . . . .	. . . . .	. . . . .

14.3 SCHEMATIC DIAGRAMS AND P.C. BOARD PATTERNS

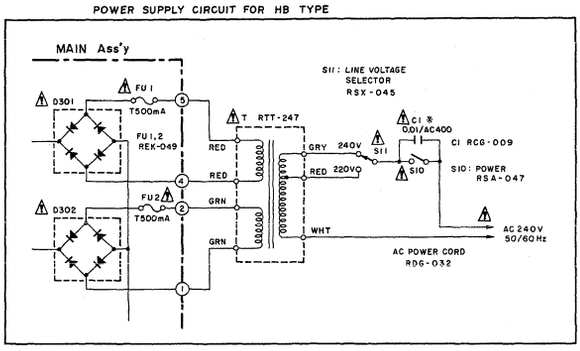
Model CT-330/HE,HB,HP and D types are the same as the CT-330/KU type with the exception of following sections.

HE, HB and HP types

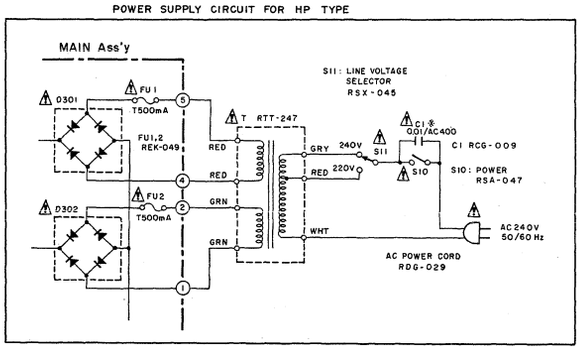
POWER SUPLLY CIRCUIT FOR HE TYPE

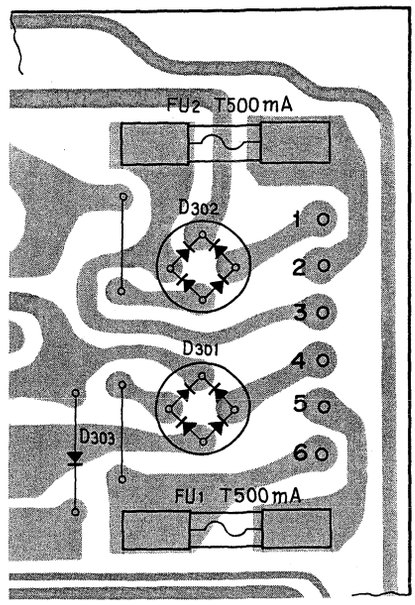


POWER SUPPLY CIRCUIT FOR HB TYPE



POWER SUPPLY CIRCUIT FOR HP TYPE





D type

POWER SUPPLY CIRCUIT FOR D TYPE